AUGUST 1, 1961

AUTOMOTIVE INDUSTRIES

ENGINEERING · MANAGEMENT · PRODUCTION · DESIGN

A CHILTON PUBLICATION

FORD TRACTOR

PLANT MODERNIZED.....Page 46

Above: Ready to drive away the new "600" Ford tractors made in the enlarged and completely modernized Highland Park, Mich., Tractor Plant.

ALSO IN THIS ISSUE . . . .

INCREASING USES OF STEEL CASTINGS
AUTOMOTIVE RELIABILITY—1961
NEW ENGINE HAS ROTARY CYLINDERS

sea-going pinions...

alloy steel of course

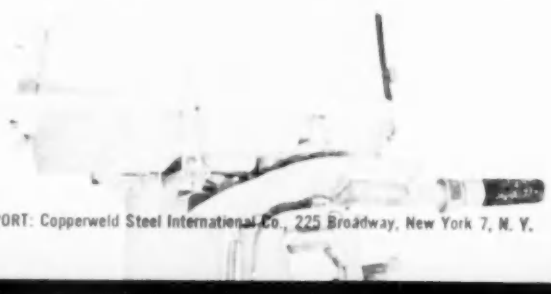
This small pinion gear operates under man-size loads. A vital part of the gear case assembly for an outboard motor, it must stand up under extreme stresses and strains—yet its size is restricted by compact design. OUTBOARD MARINE CORPORATION* selected Aristoloy 8620—added strength without increasing bulk or weight. They report that this *electric furnace* alloy machines, drills, and broaches easily—yields parts of uniform, smooth finish—and, most important, the strength and hardenability characteristics after heat treatment, which they required.

For more information about Aristoloy bars and billets, call your nearest Copperweld representative—or write today for PRODUCTS and FACILITIES CATALOG.

*Manufacturers of Johnson, Evinrude and Gale Outboard Motors

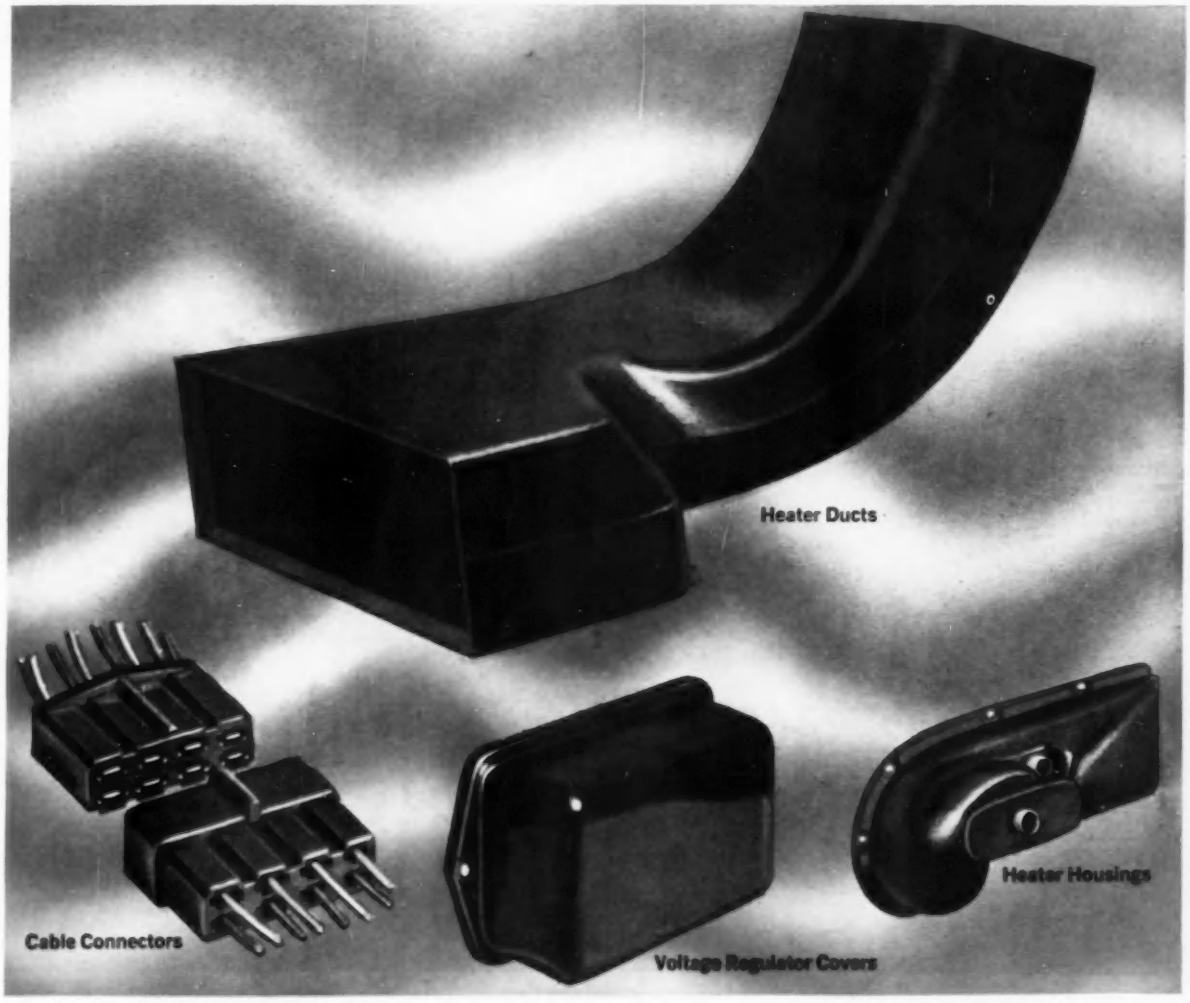
ARISTOLOY STEELS

DIVISION OF
COPPERWELD
STEEL COMPANY



ARISTOLOY STEEL DIVISION 4025 Mahoning Ave., Warren, Ohio - EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

What's News in Plastics...



Long term heat aging stability

Yours with new Escon 125 molding grade polypropylene!

Automotive applications are a "natural" for new Escon 125 polypropylene. This outstanding new grade is designed especially to maximize performance for long periods at high temperatures. Exceptional performance is achieved through a special LTHA (Long Term Heat Aging) stabilization system developed by Enjay research affiliates.

Escon 125 offers oxidative stability that, in carefully conducted laboratory tests against other commercially available grades of polypropylene designed for this type of service, outperformed all others tested. Specimens of Escon 125 withstood almost three months of oxidative aging at 300°F; specimens exposed to 250°F have shown no signs of failure after seven months.

Melt index is 5.5 at 230°C. No changes are required in equipment, processing conditions or coloring techniques from those used with general purpose molding grades. For test samples and typical properties of new Escon 125, write to Enjay, 15 W. 51st St., New York 19, N.Y.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY CHEMICAL COMPANY

A DIVISION OF HUMBLE OIL & REFINING COMPANY

ENJAY PLASTICS

← Circle 101 on Inquiry Card for more data

Circle 104 on Inquiry Card for more data →

Huber-Warco 10-D Geared for Rugged Roadwork

Three nickel alloy carburizing steels give grader transmission extra strength and toughness

Leveling airfields... maintaining haul-roads... scarifying blacktop. Everyday tasks that test a motor grader's ability to survive shock and stress.

Engineers at H-W anticipated heavy operating loads at the design stage. To give the 10-D grader built-in strength and toughness they specified heat-treated nickel steels for critical transmission gears and shafts.

For the spiral bevel ring gear they selected AISI 4820 steel (3½% nickel). This carburizing steel develops a hard, wear-resisting case backed up by an extremely tough, strong core. Type 4820 is often used for spiral bevel ring gears where operating compressive loads approach 300,000 psi.

For less heavily stressed parts H-W specified AISI 4620 and 4320 carburizing steels (1.8% nickel). Readily heat-treated to a case hardness of 60 Rc min., these steels develop core properties adequate for all but the highest operating stresses. Here is where they are used in the 10-D:

- Transmission gears and shafts
- Final drive parts – bevel pinion, bull pinion, and bull gear

When you design, build or order construction equipment, bring nickel alloy steels in on the planning stage. You'll find materials-engineering data on 11 types of heavy construction equipment in a new, 76-page Inco booklet. For a free copy, request "A-265."

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INCO NICKEL

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Circle 105 on Inquiry Card for more data

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE • PUBLISHED SEMI-MONTHLY

AUGUST 1, 1961

Passenger Cars • Trucks • Buses • Aircraft • Tractors • Engines • Bodies • Trailers • Road Machinery • Farm Machinery • Parts and Components • Accessories • Production and Processing Equipment • Design • Production • Engineering • Management

VOL. 125, No. 3

Features • • •

▼ Automotive Uses of Steel Castings Increased 74%

The use of steel castings in the automotive industries has climbed steadily ever since vehicles and equipment powered by internal combustion engines first made their appearance. Latest figures show that these industries account for over one-fourth of the total market for steel castings. Page 35

▼ Automotive Reliability '61

The Fourth National Conference of the Automotive Division of the American Society for Quality Control was the first of its kind sponsored by an industry devoted principally to consumer goods. A full report of the event is presented here. Page 41

▼ New Mechanical Plating Process

Zinc coated lock washers, plated by a mechanical process, are being turned out by Mellowes Co., Milwaukee. Because there is no electroplating, with its liberation of nascent hydrogen, there is no hydrogen embrittlement of the washers. Page 45

▼ Ford Tractor Plant Modernized

Ford Motor Co. has recently completed an extensive modernization and expansion program at its Highland Park, Mich., plant. About 290,000 sq ft of floor space was utilized, and over 200 items of new equipment added. Page 46

▼ Machine Tool Builders Report Little Change in Business Picture

AI's latest quarterly survey of the machine tool industry shows another small rise in order backlogs at the end of the 2nd Quarter, but otherwise essentially the same business situation. Added price increases will bear watching. Page 48

▼ Rotary Cylinder Engine Has Non-Reciprocating Pistons

An unusual rotary-cylinder engine, produced in England, is claimed to combine the thermodynamic efficiency of a conventional piston engine with the low stresses and friction losses of a gas turbine. Page 50

▼ Electronic Ignition System Developed in England

A new ignition system has been developed by Joseph Lucas of Birmingham, England. It is intended for engines running at 8-12,000 rpm, and is said to be capable of producing 1000 sparks per second. The device employs a magnetic pickup, with poles mounted on the engine's flywheel. Page 52

▼ 12 New Product Items and Other Features Such As:

News of the Machinery Industry; Industry Statistics; and News of the Automotive and Aviation Industry.

. . . continued on next page

MEMBER

NBP National Business Publications, Inc.

SBME Society of Business Magazine Editors

BPA Business Publications Audit of Circulation

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918. EDITORIAL EXECUTIVE OFFICES, Chestnut and 56th Sts., Philadelphia 39, Pa., U. S. A. Cable address—Autoland, Philadelphia.

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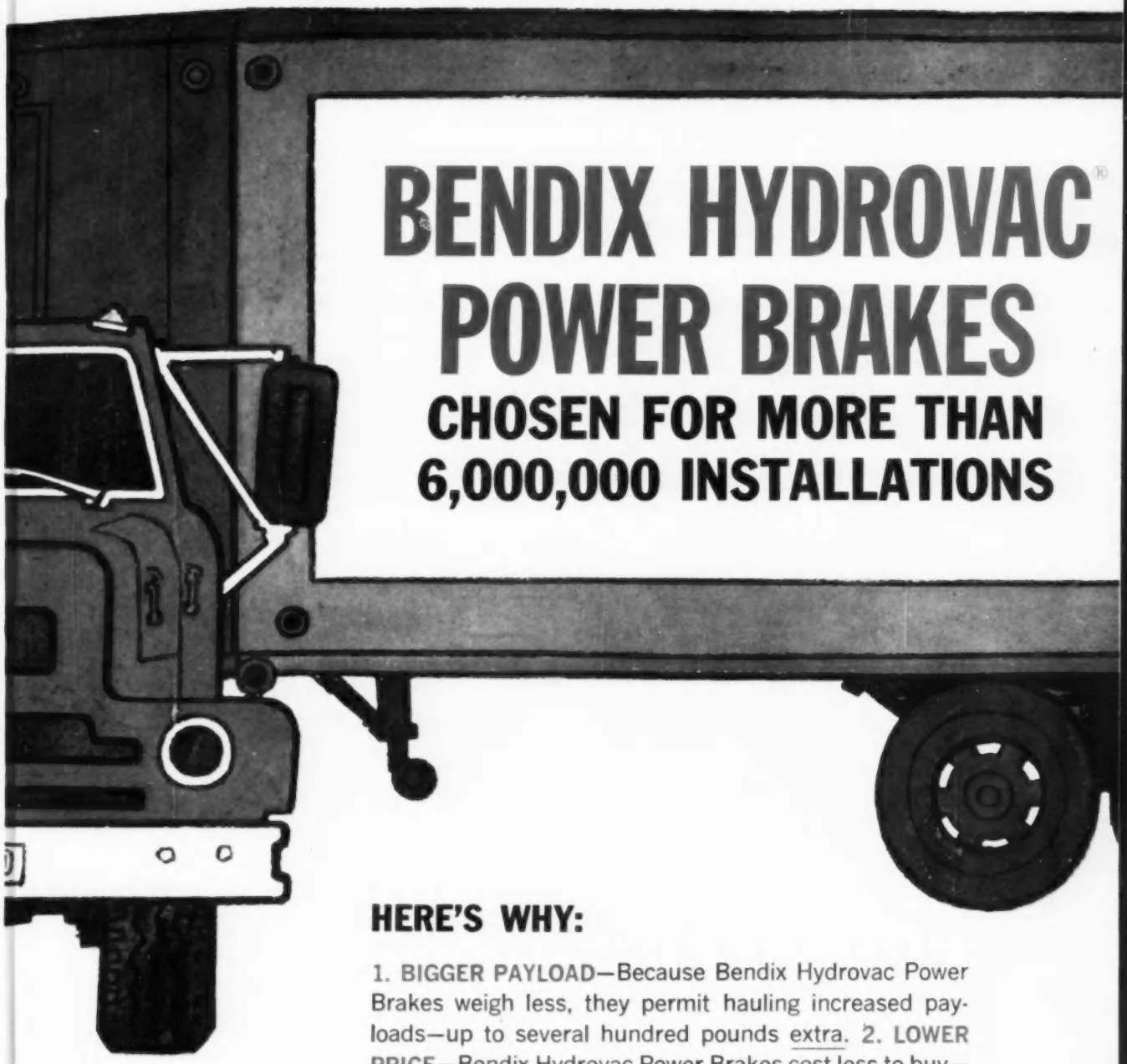

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The letterheads have been printed, signs made... and here we are wearing a new name. But in the mills things go on pretty much as they always have. We've put in some new machines and broadened our line... but essentially it's the people at Western (oops!) *Olin* Brass that really make the product. They *care*. That's the "Tailor-Made" approach.

If you're an old customer you know what we mean. If you're not – ask one of our users. Chances are he'll tell you the uniform quality and individual engineering of his metal has managed to save him money in inspection, fewer rejects and less lost time.

Olin Brass can do the same thing.

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(Brass sales headquarters at East Alton, Illinois)

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400 Park Ave., New York 22, New York.

CALENDAR

OF COMING SHOWS AND MEETINGS

Society of Automotive Engineers, West Coast Meeting, Portland, Ore. ..... Aug. 14-17

American Society of Mechanical Engineers, International Heat Transfer Conference, Boulder, Colo. Aug. 28-Sept. 1

Combined Farm, Construction and Industrial Machinery; Powerplant; and Transportation Meetings. (Including Production Forum and Engineering Display), Milwaukee Sept. 11-14

Instrument Society of America, Fall Instrument - Automation Conference, Los Angeles ..... Sept. 11-15

Society of Automotive Engineers, National Farm, Construction, and Industrial Machinery Meeting, Milwaukee ..... Sept. 11-15

Society of Plastics Engineers, "Plastics for Tooling," Indiana Section, Indianapolis ..... Sept. 12

Marking Device Association, Convention, Chicago ..... Sept. 13-15

Non-Ferrous Founders Society, Annual Meeting, Shawnee-On-Delaware, Pa. ..... Sept. 18-20

Steel Founders' Society of America, Fall Meeting, Homestead, Hot Springs, Va. ..... Sept. 18-20

2nd Industrial Building Exposition and Congress, New York ... Sept. 25-28

American Production and Inventory Control Society, 4th Annual National Conference and Technical Exhibit, Chicago ..... Sept. 28-29

National Association of Corrosion Engineers, Western Regional Conference, Portland, Ore. ..... Oct. 4-6

American Machine Tool Distributors' Association, Annual Meeting, Pittsburgh ..... Oct. 4-6

American Foundrymen's Society, 9th Ohio Regional Foundry Conference, Cincinnati ..... Oct. 5-6

Society of Automotive Engineers, National Aeronautic Meeting, Los Angeles ..... Oct. 9-13

American Standards Association, 12th National Conference on Standards, Houston ..... Oct. 10-12

National Screw Machine Products Association, Membership Meeting, White Sulphur Springs, W. Va. ..... Oct. 12-15

American Institute of Electrical Engineers, 1961 Machine Tools Industry Conference, Rockford, Ill. Oct. 16-18

Magnesium Association Annual Convention, New York ..... Oct. 16-18

American Society of Lubrication Engineers, 8th Joint Lubrication Conference, Chicago ..... Oct. 17-19

American Society of Body Engineers, 16th Annual Technical Convention, Detroit ..... Oct. 18-20

American Foundrymen's Society, Michigan Regional Foundry Conference, Michigan State U., Michigan ..... Oct. 19-20

1961 National Conference on Industrial Hydraulics, "Versatility and Reliability of Fluid Power," Chicago ..... Oct. 19-20

Circle 108 on Inquiry Card for more data

Columbium for the steel of the future

Users of steel, searching for new steels, are obtaining the necessary properties to meet this challenge through Columbium.

Future steels will provide greater strength with less weight . . . good formability . . . good weldability . . . fewer rejects . . . and all this is possible through small additions of Columbium.

Investigate the many new applications for Columbium Steel. Any steel company can advise you as to its advantages for your product or product parts . . . or write to us for complete information.

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1312, Building Number 4, Gateway Center, Pittsburgh 22, Pa.

Offices: Pittsburgh, Chicago, Los Angeles, New York, San Francisco
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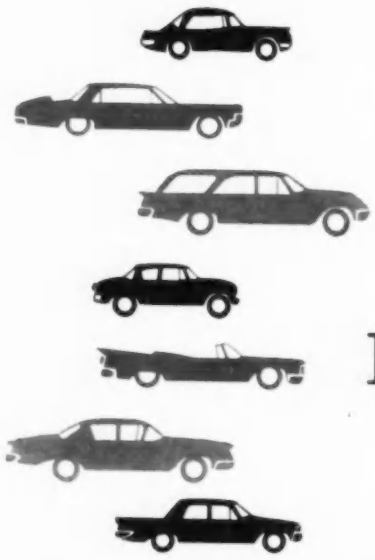
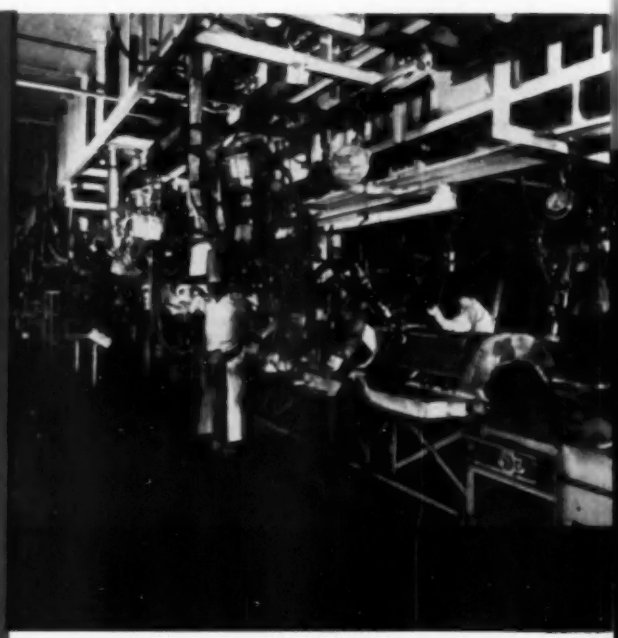


Helping to meet today's

TWO HIGH-SPEED FENDER PRODUCTION LINES produce more than 850 fenders per hour for one of America's leading low priced cars. Record volume results from complete integration of most modern equipment and operating procedures in continuous-line setup—from start of stamping through assembly to shipping.



SPOT WELDING OF REAR FLOOR PAN SECTIONS for one of the country's leading high price, luxury cars. Cross members and side panels are of galvanized steel while pan is of carbon steel. Combination provides added corrosion resistance. Budd has pioneered techniques for use of galvanized steel in automotive body fabrication. Line shown has capacity of 250 units per day.

"AUTOPIA" a new sound film in color—tells the complete story of our automotive facilities. If you are interested in seeing this film, write on your company letterhead to Sales Department, Automotive Division, The Budd Company, Detroit 15.

The automotive industry today faces many complex production problems and the trend is toward even greater complexity in the future with car manufacturers bringing more new models to market. As one of the world's oldest and largest independent automotive suppliers, Budd Automotive has acquired facilities and developed skills that make it uniquely qualified to meet both current and future production needs. Versatile equipment and techniques plus highly skilled personnel provide a remarkable flexibility that assures quality components, in the quantities specified, on schedule. In addition, Budd has unequalled tool making and die tryout facilities for almost any application. Meeting varied production requirements, both large and small, is but one of the many ways Budd serves the automotive industry in "helping to make tomorrow's cars today."

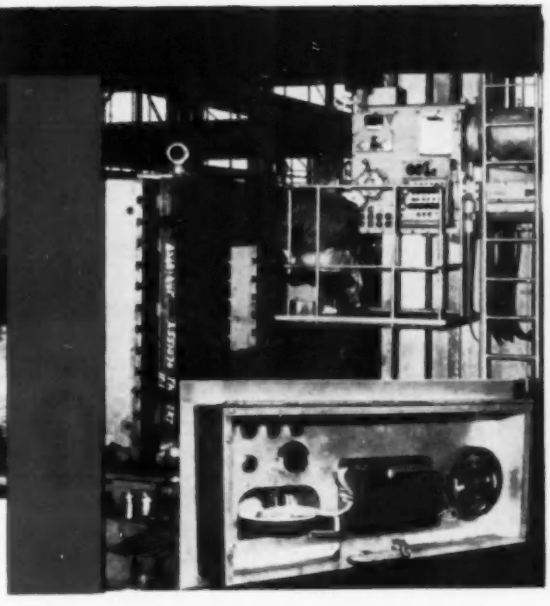
complicated production problems

Budd Automotive

DETROIT 15, MICHIGAN

A DIVISION OF THE BUDD COMPANY

COMPLETELY AUTOMATED WELDING LINE handles up to 800 underbodies per shift. Designed and built to Budd specifications, it represents an important step in the production of single-unit construction bodies for major manufacturer. Layout and equipment make it one of the most modern welding lines in the automotive industry.

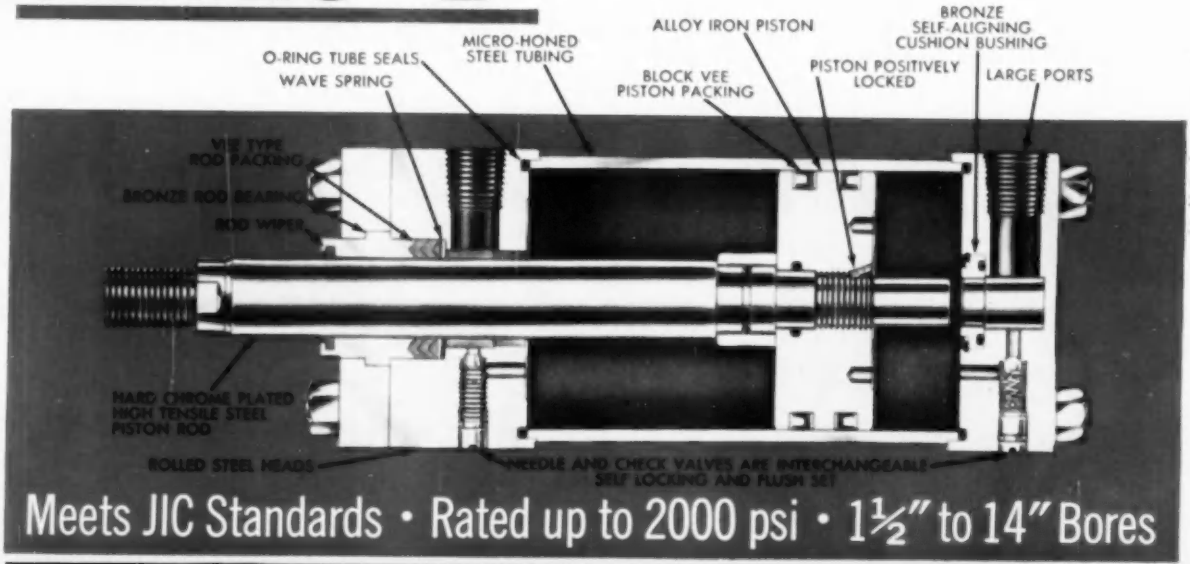


TAPE CONTROLLED horizontal boring and drilling machine is typical of Budd's continuing efforts to increase efficiency and speed production. Tape programming results in machine automatically positioning itself for each boring or drilling operation—eliminating error and saving up to 80% on operating time.

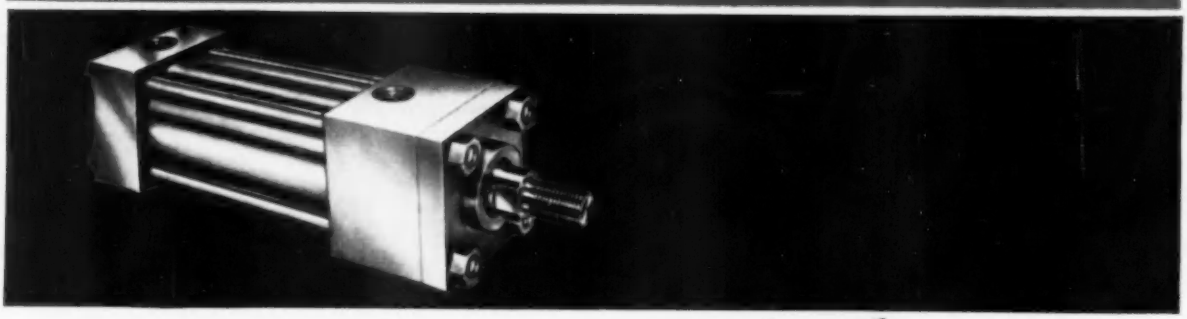
NEW O-M SQUARE HEAD HYDRAULIC CYLINDER

now available

SERIES "L"



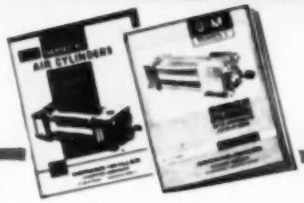
Meets JIC Standards • Rated up to 2000 psi • 1½" to 14" Bores



For years, you have looked to Ortman-Miller for the original space-saving, tie-rodless air and hydraulic cylinders. Now, with the introduction of the new Series "K" air cylinder, recently announced, and the new Series "L", hydraulic cylinder, featured above, you can look to O-M for all of your cylinder requirements.

A product of the teamwork of O-M specialists, this new Series "L" hydraulic unit reflects the research, design, engineering and production capabilities and experience that are an integral part of every O-M cylinder. The result, a quality, hydraulic cylinder designed for long service, high operational efficiency and quick, easy maintenance, dimensionally interchangeable with most cylinders of a like type.

For complete details mail coupon today for Bulletin No. 116 in which all cylinders have been dimensioned in accordance with NFPA recommendations for your convenience.



ORTMAN-MILLER MACHINE COMPANY
17 143rd Street, Hammond, Indiana

☐ Have representative call

Send Bulletins

☐ 115 Series "K" ☐ 116 Series "L"

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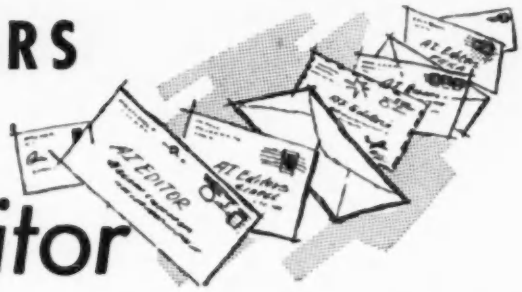
COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Circle 111 on Inquiry Card for more data

LETTERS to the Editor



Readers' opinions or requests for additional information on material appearing in the editorial pages of AUTOMOTIVE INDUSTRIES are invited for this column. No unsigned letters will be considered, but names will be withheld on request. Address *Letters to the Editor*, AUTOMOTIVE INDUSTRIES, 56th & Chestnut Sts., Philadelphia 39, Pa.

SCOUT

As usual, my reading habits run late. So I just read your story about our four cylinder engine in the April 15 edition.

You gave your usual fine play to the article, and showed the photos to advantage.

Thank you very much for the professional handling. The Scout schedules remain high and we firmly believe we really have something with this new vehicle and our Indianapolis-made engine.

Thomas Kelly
Public Relations Manager
International Harvester Co.
Indianapolis, Ind.

SPARKPLUG PRESSURE PICKUP

In the July 15, 1957 issue of AUTOMOTIVE INDUSTRIES, there is an article entitled "Combination Sparkplug and Pressure Pickup."

We are quite interested in obtaining this type of equipment for our labs and research work and would appreciate knowing who manufactures this specific item described.

C. F. Whitehill, Asst. Professor
Dept. of Mechanical Eng.
Montana State College
Bozeman, Mont.

● *Sorry, we no longer have the material from which this article was developed.—Ed.*

PLAUDIT

I have just read with great interest your article in the June 1 issue of AUTOMOTIVE INDUSTRIES covering the Evinrude connecting rod assembly. It is apparent that a lot of work went into this article and I want you to know that you did a beautiful job. Your mention of Gilman Engineering is, of course, greatly appreciated.

We currently have six more machines in process here for the automotive industry.

C. C. Holloway, President
Gilman Engineering & Mfg. Co.
Jamesville, Wis.

ORIGINAL V-6?

Recent news items concerning the introduction of V-6 engines has created some talk.

If my memory serves me correctly, a passenger automobile was actually produced with a V-6 block in the U. S., sometime in the period between 1924 and 1928. Probably this car was not produced in large quantities, but only a limited number sold.

Is there any way that you could check or confirm these facts and advise me as to the name of the car, where it was produced and how many were manufactured?

R. F. Neilson, General Manager
Neilson Chemical Co.
Detroit, Mich.

● *Confirm we can not. No record of such a vehicle exists in our files.—Ed.*

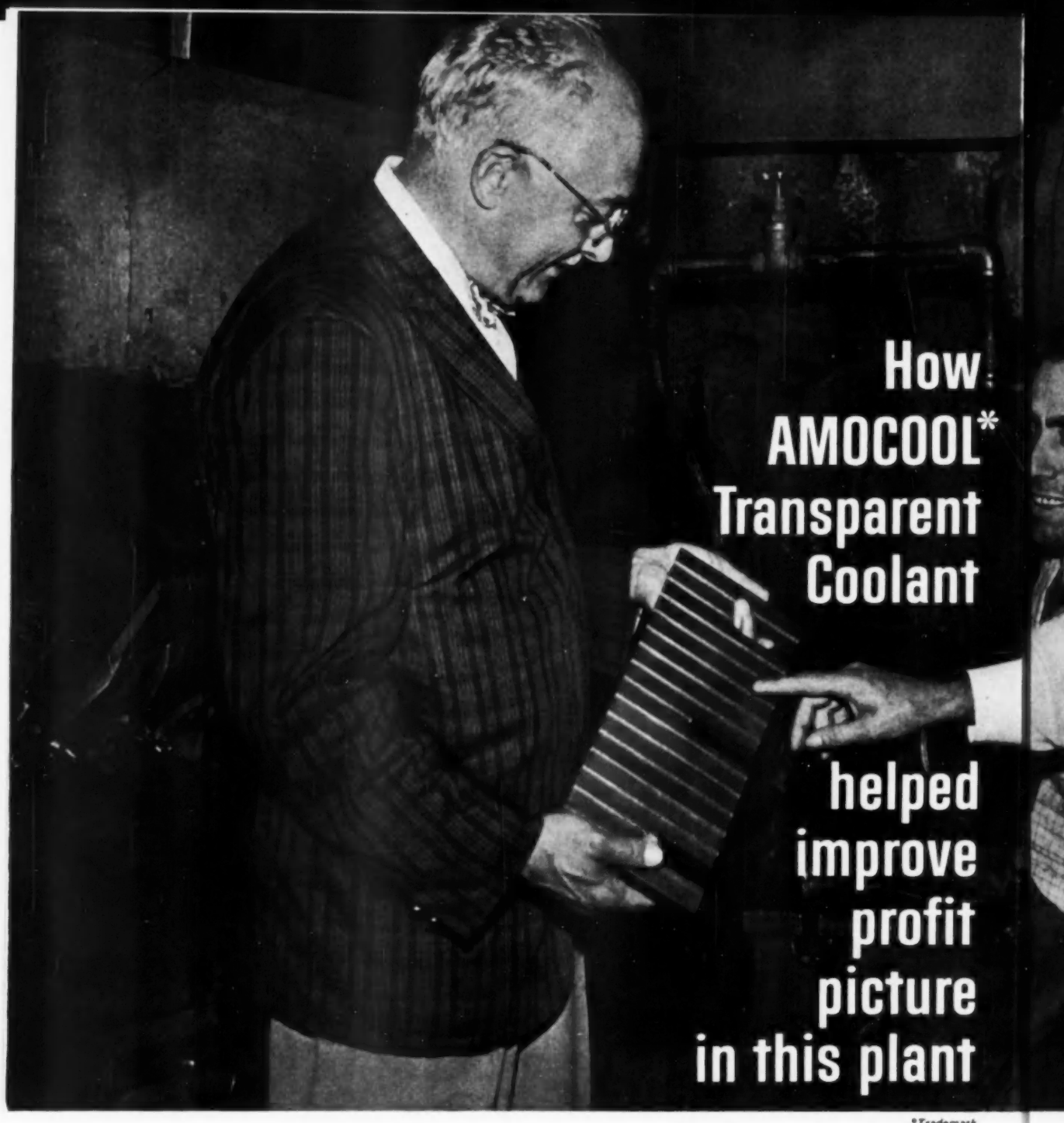
THE AUTOMOBILE

I have John B. Rae's book, "American Automobile Manufacturers," which you published. Since I consider it to be the best historical book on the early automotive industry, I use it as a reference when I am questioned about early cars and unfamiliar names.

On page 50, reference is made to a company known as Aerocar with an additional reference to The Automobile, July 9, 1908. Since this magazine was the predecessor to AUTOMOTIVE INDUSTRIES, I am wondering if you could furnish me with a copy.

H. C. Snow, Chief Engineer
Checker Motors Corp.
Kalamazoo, Mich.

● *Checking sources now.—Ed.*



*Trademark

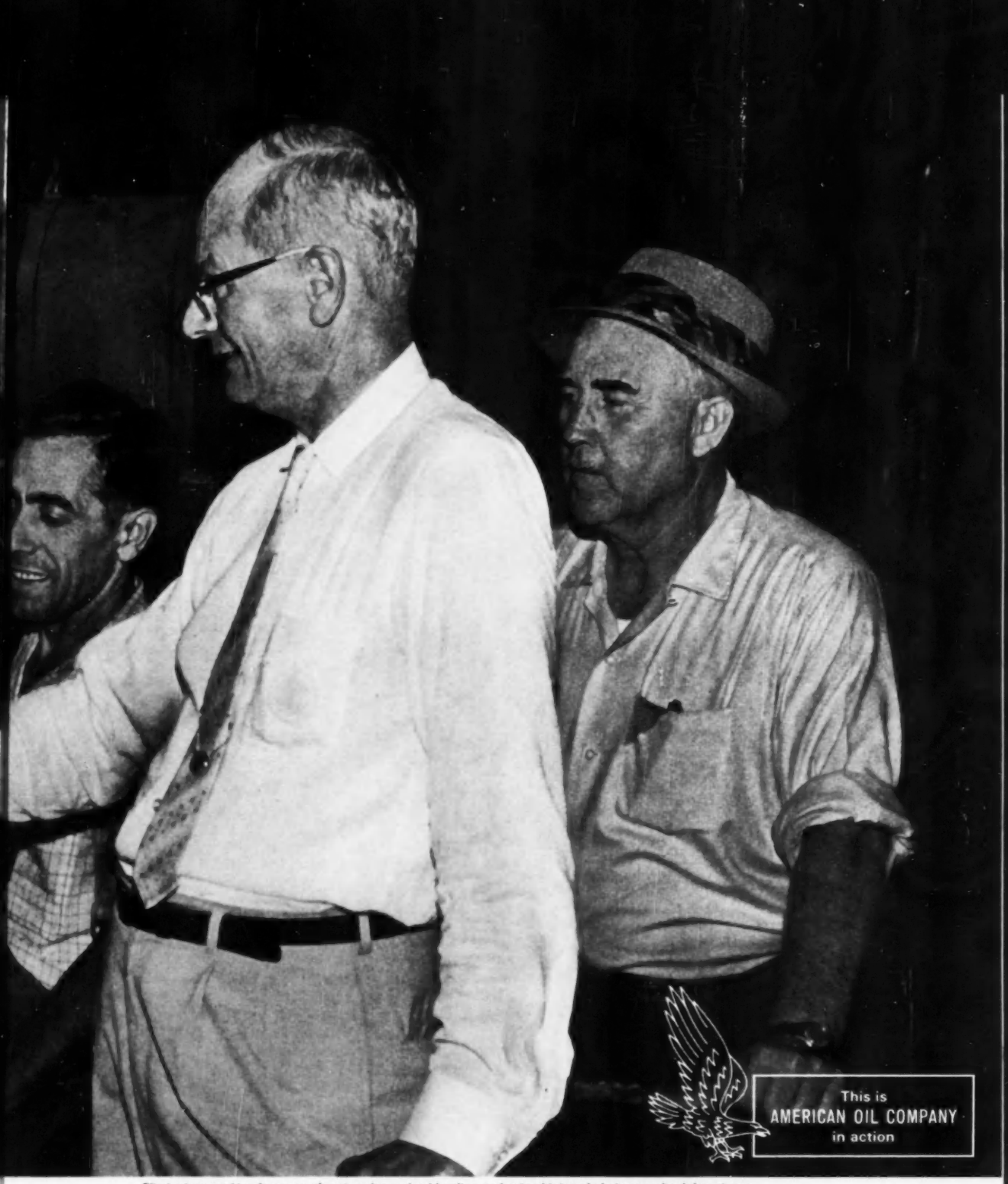
BY PAUL E. "PAPPY" STRATTON

About the Author. "Pappy" Stratton has been providing technical help on lubrication and metalworking problems to customers in the Detroit area for nearly all of the twenty-five years he has been working for the company. In addition to having this store of practical experience to help him, Pappy has completed the Company's Sales Engineering School.

* * *

By using a soap-base grinding compound, Detroit Edge Tool Company was getting excessive corrosion and rust on work and grinding machines. Oil vapor was collecting on machines and on the ceiling, causing dirty working conditions. Most important, high wheel loading was causing frequent down-time for wheel dressings.

We worked out a test program on AMOCOOL Transparent Coolant with the management. On our first test on one surface grinder, feed pressure was cut substantially while at the same time metal removal was increased.



Eliminate reworking because of rust, reduce wheel loading and extend intervals between wheel dressings; do these and you increase profit per unit, explains Detroit Edge Tool president, Dan Ebbing, to P. E. "Pappy" Stratton of American Oil. Plant manager, John Yonker (right) and Sam Vineh, operator, look on.

The cost of reworking parts to remove rust was eliminated. Time required to clean machines to get rid of the odor was cut in half. Less wheel loading and fewer wheel dressings have upped production and reduced costs. Our test program paid out in an improved profit picture. All grinding and drilling equipment has been converted to AMOCOOL Transparent Coolant.

* * *

Would you like this kind of technical help to assist you in improving profits? Get it by calling the American Oil Company office nearest you.

Quick facts about
AMOCOOL*
Transparent Coolant

- Clear, transparent fluid
- Controls corrosion on work and machines
- All chemical. Does not support bacteria growth
- Unaffected by humidity
- Fire resistant
- Odorless

AMERICAN

AMERICAN OIL COMPANY
910 South Michigan Avenue
Chicago 80, Illinois

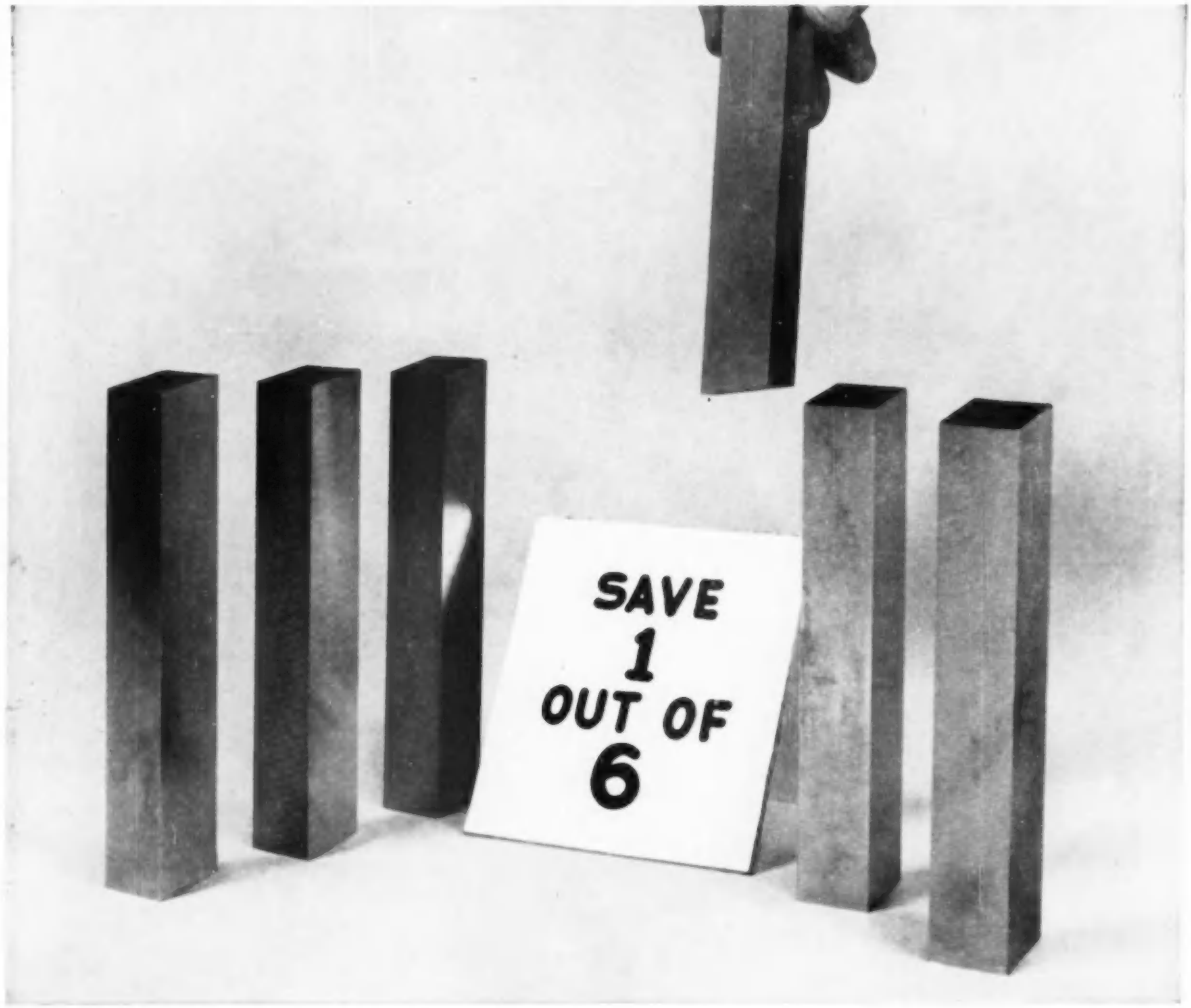
Roebling Tire Bead Wire: Packaged for Maximum Benefit

The problems eliminated by this unique reel-less core packaging system are manifold. Loads are palletized two cores per pallet and may be stacked two or three high. This, plus the fact that you need not accumulate empty reels means storage space requirements are cut to *less than half*. You do away with all freight and handling costs on reels, the bother and expense of "bookkeeping" returnable reels, and the freezing of money in reel deposits.

This is typical of Roebling's advanced packaging methods—that makes handling Roebling high-quality wire so much easier. For details on this efficient Roebling Tire Bead Wire packaging method, or information on other types of Roebling wire, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation



INCREASE TOOL LIFE AS MUCH AS 20%

Read how a "Cleartex Cure" ends the cutting oil dilution problem forever . . . increases tool life . . . slashes per-piece production costs as much as 40%.

Lube oil may be leaking into your cutting oil sumps this very minute. Surveys show it happens in 70% of all automatics. This dilution will reduce tool life, increase downtime, and result in premature discarding of cutting oil.

How a "Cleartex Cure" works. A "Cleartex Cure" checks these losses right away . . . prolongs tool life as much as 20%. Here's why: Cleartex Oil—heart of a "Cleartex Cure"—is used in both cutting and lubricating sumps. Cutting oil strength is always full—regardless of leakage. Over-all savings can slash per-piece production costs as much as 40%. Versatile Cleartex is a hydraulic fluid, too. *In fact, it's the tri-purpose cutting oil.*

How to take a "Cleartex Cure." Getting the full benefit of a "Cleartex Cure" is easy. An experienced Texaco engineer will survey your automatic set-up. He'll tell you which machines will benefit from Cleartex. Our illustrated booklet, "Cleartex in Automatic Screw Machines," spells out the benefits of a "Cleartex Cure" in detail.

To get the booklet, plus the survey, contact the nearest of the more than 2,300 plants distributing Texaco Products, or write Texaco Inc., 135 East 42nd Street, New York 17, N. Y., Dept. AI-110.

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV

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NEWS

Vol. 125, No. 3 August 1, 1961

Gas Turbine Tractor

I-H Also Uses Hydrostatic Transmission

International Harvester Co. has displayed a tractor with a gas turbine engine and hydrostatic transmission, believed to be the first time this combination has been tried on a farm utility tractor.

Called the HT-340, the tractor has no gear shift lever, no throttle, brake or clutch pedals. It uses neither cooling water nor anti-freeze, and it has no transmission gears.

A. E. W. Johnson, Harvester's vice president of engineering, and C. H. Meile, chief engineer, engineering research, said its oil consumption is almost nil, and it will operate on virtually any kind of liquid fuel. Its forward and reverse speeds are infinitely variable. It is said to start readily at low temperatures and is notably free of vibration. Its aceleration and torque characteristics are declared to be excellent.

Manufactured by Solar

The gas turbine, an 80 hp, single shaft Titan T62T, is a product of the Solar Aircraft Co., Harvester's San Diego subsidiary. It is capable of delivering horsepower roughly equal to its weight. It's a midget beside the 450-lb, 40-hp piston engine formerly paired with the hydrostatic transmission. It is 21 in. long, less than 13 in. in diameter, and weighs only 90 lb with reduction gearing.

Similar in basic principle to other gas turbines, the Solar Titan draws in air, compresses it and then mixes it with fuel in a combustion chamber. Hot gases produced from ignition of the air-fuel mixture spin a vaned turbine wheel. The engine in the HT-340 has a single turbine that turns the output shaft directly, producing constant engine speed.

At present, the HT-340 can use only about half of the turbine's rated horsepower since the transmission was designed to operate with a 40-hp piston engine.

"Our intent in developing this tractor," Mr. Meile said, "is to continue our investigation of new types of power systems. This is one of the combinations that is both new and promising. We hear a lot today about 'dream' tractors

HT-340 Pairs Gas Turbine, Hydrostatic Transmission

that will give the operator everything from food warmers to television. This seems to imply that the farmer of the future will have to spend most of his time in the field running a tractor—that he will want all the comforts of home right beside the steering wheel.

Different Point of View

"Our point of view is different. We think operator comfort is important, but we're just as interested in designing a tractor that is easy to operate and that will get its work done in the least amount of time. Tomorrow's farmer, we think, will prefer to enjoy the comforts of home at home. This is the direction in which we are moving in our research with this tractor."

Minus all the gears, shafts and splines of a conventional transmission, the gas turbine-hydrostatic transmission system depends on oil at high pressure to transmit power by acting on the pistons of a radial hydraulic motor installed in each driving wheel. Thus, the turbine engine's power operates the variable displacement pump which energizes the transmission.

To start the engine, the operator merely pushes a button, and an automatic sequence box takes over to connect the starter and energize solenoids. After that, except for steering, he is concerned with only one control—the transmission lever—to change forward and reverse speeds and to stop. It has a maximum speed of 11 mph.

The small size of the HT-340 gas turbine engine made it possible for Harvester's industrial engineers to work out a radically new visual concept, using molded fiberglass as the chief material.

Its low, forward-sloping hood line provides visibility for the operator that would be impossible if the tractor had a water-cooled piston engine. Placing the fuel tank behind the operator offered another advantage for visibility and styling.

"We built this tractor because we are aware of the problems it poses," Mr. Meile said. "We want to get experience for a quantitive evaluation of this type of power system. Despite recent progress, fuel economy remains a big question in the minds of all who are interested in using turbines to propel ground vehicles. We are certainly making no claims for the HT-340's fuel economy.

Heat Exchangers Next?

"At this point in our research program, we haven't even tried to improve it. Heat exchangers, or regenerators, to recover heat from exhaust for preheating intake air, would seem to be the answer. We already are working with regenerative cycle engines. That will be our next step. It also will solve the problem of heat at the exhaust stack, which, with a regenerator, will actually be less than that in a piston engine."

Noise is another gas turbine problem, but Mr. Meile said it was no louder, at full throttle, than in a conventional tractor engine. With both engines idling, however, the gas turbine seems noisier. This is said to be due to the higher frequency of its pitch.

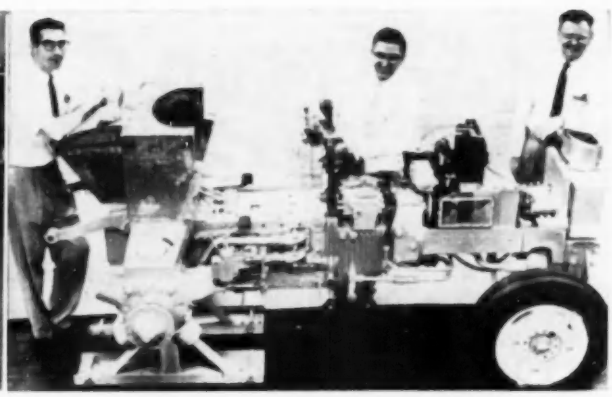
Harvester engineers say much research remains with heat-resistant materials and precise production methods before the gas turbine can become a competitive, commercial power source for a farm tractor. Currently, low-volume production of components for the turbine, as well as for the hydrostatic transmission, would place the price of a tractor like the HT-340 far beyond the reach of the average customer.

The newest thing in tractors was displayed for the first time at the University of Nebraska's 10th annual Tractor Day at Lincoln.

Cheilek Promoted

Harold A. Cheilek has been named associate technical director of Cornell Aeronautical Laboratory, Inc.

Fiberglass Rear End Section Covers Fuel Tank



Profile View of Research Tractor

NEWS

CONTINUED

More to Buy New Cars

More persons plan to buy new autos during the next 12 months than planned to do so a year ago. Additionally, an unusually large proportion of would - be buyers plan to purchase new cars during the fourth quarter of this year.

The favorable outlook for new car sales was the bright spot in the latest quarterly survey of consumer attitudes made by the Michigan Survey Research Center at the University of Michigan.

The survey also revealed a probable decline in purchases of used cars but showed consumers continue to evidence interest in new compacts.

The proportion of persons who believe automobile prices are reasonable or that they will rise in the near future is lower than a year or two years ago.

Plans to purchase homes are higher than a year ago but are substantially lower than in June, 1959.

Plans to purchase major electrical appliances continue fairly low, especially among middle and lower income groups.

Improvements, additions or repairs to homes were the same as a year ago and much more than two years ago, the survey revealed.

Optimism of the public, it was shown, was restrained by the knowledge of substantial unemployment.

New Anti-Smog Entry

American Cyanamid Co. and Walker Mfg. Co. have entered the California automobile smog derby.

The two companies said they would soon submit a reasonably priced catalytic type exhaust purifier to the Motor Vehicle Pollution Control Board in California.

A score of companies already have submitted devices in California. However, the board has not certified any of the devices.

AIA Picks Esenwein

August Esenwein, retired executive vice president of the Convair Div., General Dynamics Corp., has been elected president of the Aerospace Industries Association.

AMC Earnings Spurt

Sales and earnings of American Motors Corp. took a sharp upturn in the third quarter ending June 30.

Earnings for the three-month period were $7.6 million, or 43 cents a share, compared with $2.2 million, or 12 cents a share in the previous quarter.

President George Romney announced that net sales in the third quarter were $244.5 million, up 36 per cent over the previous quarter when $179.7 million sales were reported.

NEWEST BRITISH MODEL HAS OPTIONAL TRANSMISSIONS

The Singer Vogue, newest addition to the Rootes range, is longer and wider than the Hillman Minx. The 97 cu. in. engine develops 66.5 hp at 4800 rpm. Optional transmissions are overdrive or automatic. The integral chassis has only four grease points. Luxury-trimmed body with twin headlights features figure-contoured seats and walnut-veneered dash board.

NEWS

CONTINUED

New Casting Process

A revolutionary method of casting artillery and mortar shells has been announced by Maj. Gen. William K. Ghormley, commander of the Army Ordnance Special Weapons Ammunition Command, Dover, N. J.

The new process permits the casting of shells from malleable iron instead of forged steel.

Gen. Ghormley disclosed that a production contract for 174,000 rounds of 81 mm mortar shells at a cost of $935,000 had been awarded to the Albion (Mich.) Malleable Iron Co., developers of the process.

Ford Grants License

Ford Motor Co. has granted a license to Vascoloy Ramet Corp., of Waukegan, Ill., to make Ford patented titanium carbide materials, which have found their principal application in cutting tools. This is the first license granted on the Ford patent.

Titanium carbide materials use a combination of nickel and molybdenum to bond the titanium carbide. The finished materials contain some 80 per cent titanium carbide and approximately 10 per cent each of nickel and molybdenum.

Production applications of the titanium carbide have been proven in the machining of gear blanks, automotive brake drums and transmission parts, missile bodies, steel mill rolls, large implement gear blanks, and a variety of shafts for all types of machinery and equipment.

AMC Engineering Unit

A major step in American Motor Corp.'s expanded engineering and research programs has been achieved with the opening of its new automotive engineering center in Kenosha, Wis., according to R. H. Isbrandt, vice president, automotive engineering and research.

"The new facilities will permit further expansion of Rambler research and development programs, which have more than doubled since 1958," Mr. Isbrandt said. "In the same period, engineering and research personnel increased 80 per cent."

The engineering building, acquired in 1959, provides 140,000 sq ft of operating floor space.

A "cold room" for testing cars under sub-zero conditions and a "heat room" have been installed. Other facilities include a carburetion laboratory, rear axle and transmission development, welding rooms, electrical laboratory, stress laboratory, drafting rooms, and quality control department.

S-P Research Unit

Establishment of an applied research division to develop new products and improve existing products has been announced by Sherwood H. Egbert, president, Studebaker-Packard Corp.

Mr. Egbert also announced the appointment of Maynard J. Isley, research pioneer in ballistics weapons systems, as head of the division.

"The new division will enable Studebaker to participate more fully in the research revolution now in progress," Mr. Egbert said. "National surveys indicate we are on the threshhold of the greatest outpouring of new products and services in the history of American inventions and innovations.

"We are planning to expand our ability to supply governmental and defense needs, principally in the electronics and electromechanical manufacturing categories," Mr. Egbert added.

Record Tire Year?

The tire industry can look forward to a record year in 1962, Raymond C. Firestone, president of Firestone Tire & Rubber Co. said.

He told West Coast dealers that record sales of replacement tires this year forecast the mounting 1962 volume. He added that sales of replacement tires this year should reach 71 million, making it the second best year in the industry's history.

FIAT'S LARGEST ADDITION

The 2300 uses the existing six-cylinder engine with capacity increased to 139 cu in. and output to 117 hp for 100 mph performance. It features servo-assisted disk brakes on all wheels, thermostatically-operated cooling fan with electro-magnetic clutch and side window demisting ducts.

B.F.Goodrich

Flooring for Station Wagons consisting of fabric coated with Geon plastisol, then embossed in patterns, is made in many colors by Barley-Earhart Corporation, Portland, Michigan. B.F.Goodrich Chemical Company supplies the Geon vinyl.

Today's "covered wagon" wears a floor of Geon

Covered wagons of the past had it easy. They carried heavy loads—and sometimes loads of children, too. But they didn't have to maintain a look of luxury at the same time. Station wagons do—which is why car makers select this flooring made with Geon vinyl.

Geon gives this flooring unusual resistance to scuffing. Geon vinyl plastisol is easily applied to the fabric backing and then embossed with the desired pattern. A limitless variety of colors and surface effects is possible. The hard-wearing flooring reduces noise and vibration and is a dominant contribution to interior station wagon styling.

The flooring is washable, waterproof and stainproof. It resists dirt, grease, grime and alkalies. It lies flat, no turning up at edges. It's another example of the way Geon improves a product, opens whole new markets. For more information, write Department NP-4, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

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a division of The B.F.Goodrich Company

Geon VINYLS

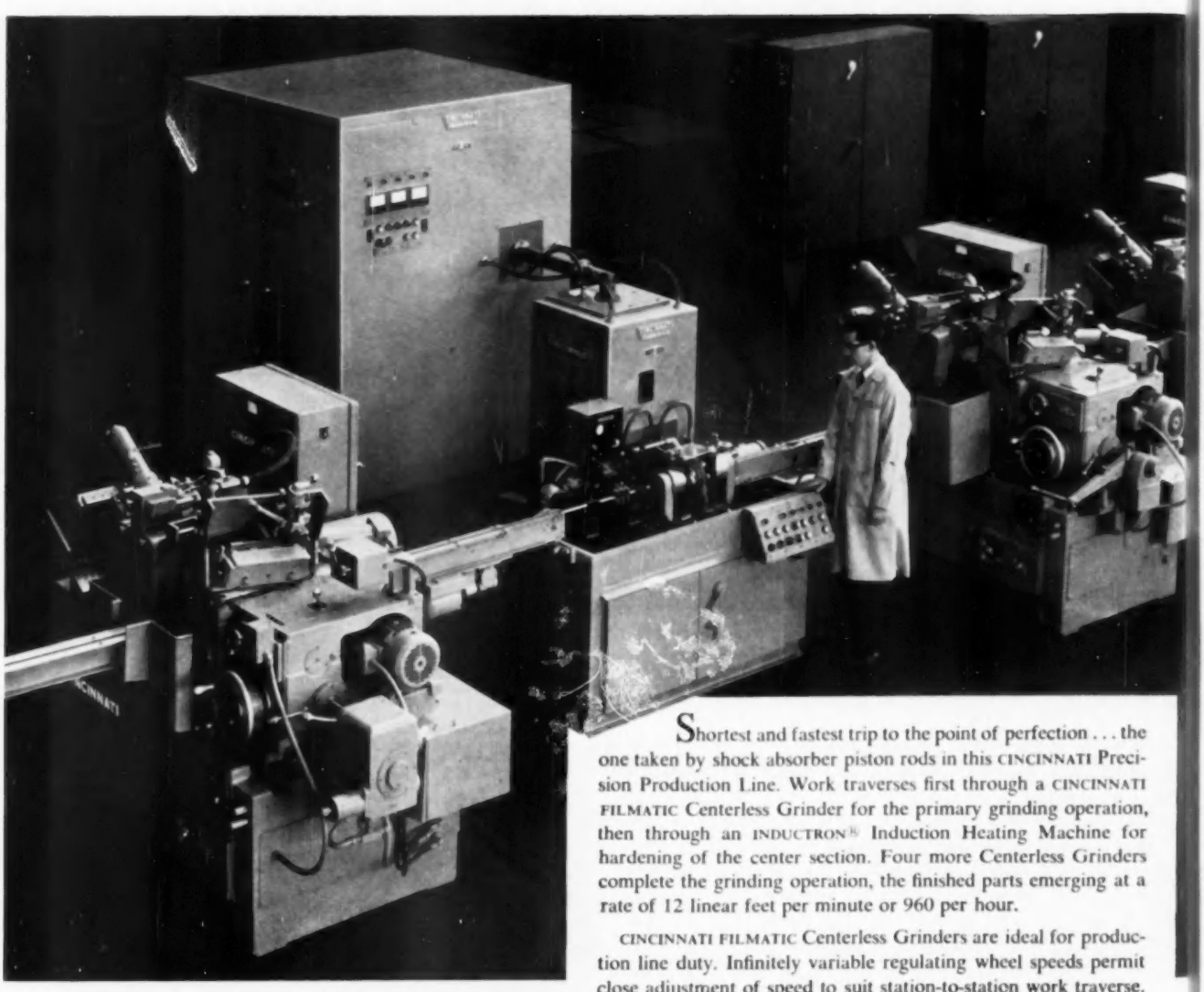
Circle 116 on Inquiry Card for more data

Circle 117 on Inquiry Card for more data →

CINCINNATI

Twelve linear feet of parts every minute

hardened and ground on CINCINNATI FILMATIC Precision Production Line



Perfection, 960 times every hour. Continuous flow of shock absorber piston rods, selectively hardened and centerless ground on this CINCINNATI Precision Production Line, eliminates unnecessary work handling. Line consists of five CINCINNATI FILMATIC Centerless Grinders and one INDUCTRON Induction Heating Machine.

Shortest and fastest trip to the point of perfection . . . the one taken by shock absorber piston rods in this CINCINNATI Precision Production Line. Work traverses first through a CINCINNATI FILMATIC Centerless Grinder for the primary grinding operation, then through an INDUCTRON® Induction Heating Machine for hardening of the center section. Four more Centerless Grinders complete the grinding operation, the finished parts emerging at a rate of 12 linear feet per minute or 960 per hour.

CINCINNATI FILMATIC Centerless Grinders are ideal for production line duty. Infinitely variable regulating wheel speeds permit close adjustment of speed to suit station-to-station work traverse. Simple swivel plate adjustment aligns work rest and regulating wheel unit with conveyor. FILMATIC grinding wheel spindle bearings will never stop production. Many other feature-advantages are outlined in Catalog G-727-1D, covering the Centuramic line of centerless grinders. May we send you a copy? **Grinding Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**

CINCINNATI
GRINDING MACHINE DIVISION

PRECISION GRINDING MACHINES: CENTERTYPE • CENTERLESS • MICRO-CENTRIC • ROLL • CHUCKING • PRODUCTION LINES

NEWS

FEATURES

Expendable Army Truck

All-Plastic Vehicle Awaits Winter Tests

The era of the expendable military vehicle will take a giant step toward reality this winter when the Army accepts delivery of an all - plastic experimental prototype ¼-ton truck for evaluation.

Named the Fox, the floatable plastic test rig was designed and developed by the Detroit Arsenal in conjunction with Fairchild-Stratos Corp. of Bayshore, N. Y.

Research on the vehicle was performed by John M. Reynar, plastics project engineer, and Herman Nadler, flotation and propulsion member of the Arsenal's research directorate. Assembly was under the direction of Herbert R. Blankle, chief research and installation engineer, Stratos' Hydraulic Div.

Hydraulic Motors

The truck is powered by a Kohler K622 air-cooled, four-cylinder gasoline engine developing approximately 40 hp. The engine drives a 21 mm hydraulic pump which in turn supplies power to a 32 mm fixed displacement hydraulic motor at each of the four wheels. To govern wheel torque, a lever located to the right of the drivers' seat regulates the pump swash plate. Each wheel motor has a capacity of 450 lb-ft torque at 3000 psi.

Power can be transmitted to either front or rear wheels as well as all four wheels at once. In addition, a 21 fixed displacement motor mounted at the rear of the hull can be powered to operate a propeller for water travel.

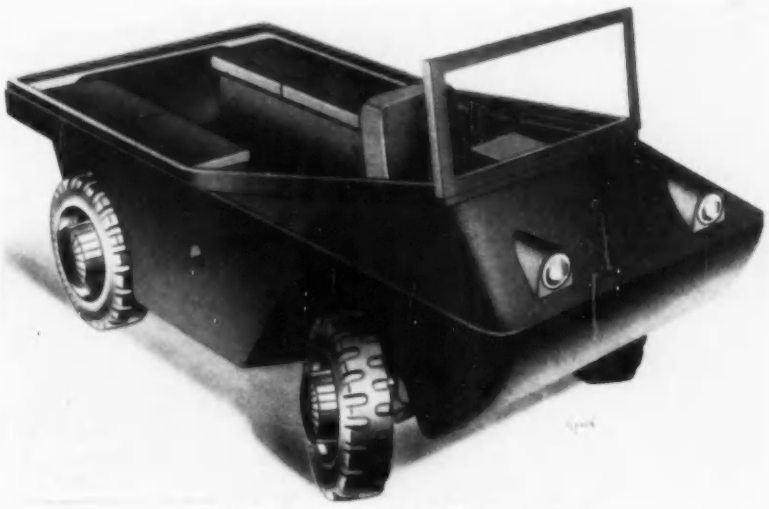
The body of the Fox is constructed of laminated fiberglass with basic structural members designed for wheel loads of 2000 lbs through the axle at each wheel and 8700 lb-inch of torque. Reinforcements and suspension couplings are all made of plastic.

The vehicle has three fiberglass seats for personnel transport. The driver's seat is located just behind the front axle in the middle of the truck. The passenger seats are located just forward of the rear wheel wells. These side seats fold against the inside of the side walls when not in use to provide more cargo space.

Braking is provided by the dynamic force of the hydraulic pump. Setting the pump swash plate at zero degree position creates an internal hydraulic lock in the power train. A lightweight cone brake at each rear wheel provides parking and emergency braking.

An independent suspension at each wheel utilizes plastic arms pivoting from the hull cushioned by Firestone Airide springs. The

(*Turn to page* 27, *please*)



Artist's Conception of All-Plastic Fox

AI TABLOID

Problems associated with components of ion rocket engine systems are analyzed in an Air Force research report. Also available are three reports on the ionic nature of molten salts, dosimetry by luminescence degradation, and a solid state Bragg-Gray cavity chamber.

* * *

The effect of single trace alloy additions on the properties of pure iron is studied in an Air Force report. Also available is a research report on development of optimum properties in forged titanium-aluminum-molybdenum alloy.

* * *

The use of electron bombardment of metals at low temperature as a method of studying radiation damage caused by direct atom displacement is described in an Air Force report. Also available is a research report on X-ray mass attenuation coefficients.

* * *

Experts declare a silver shortage within a year or two is a distinct possibility. World consumption, they point out, has consistently exceeded mine production over the last decade. A shortage would have a critical effect on battery manufacturers, photocopy industry and the electrical industry.

* * *

Chemical sales in the United States in 1960 reached a new high —$27.7 million, compared with the 1959 high of $25.6 million. The 1958 figure was $23.1 million. Output of most large-volume chemicals reached new peaks while rubber and plastics operating levels also were higher.

* * *

The evolution of nickel-base precipitation-hardening superalloys is traced in one of three memorandums released to industry and the public. The two other memorandums are on iron-aluminum-base alloys, and the pickling and descaling of high-strength, high-temperature metals and alloys.

High-impact metal forming, current metal plate theories, and heat sink materials are the major subject categories of three annotated bibliographies released to industry and the public.

* * *

Results of a study of the air flow characteristics of parachute fabrics at simulated altitudes from sea level to 150,000 feet are presented in one of four Air Force reports on textile research.

* * *

Methods have been developed for the preparation of non-oxidic refractory foams of controlled pore diameter, spacing, and continuity, according to an Air Force report. Also available are three reports on borons and silicides of the transition metals, a literature survey on the use of organo-metallic compounds in the preparation of ultra-pure metals, and on hydrogen overvoltage on silver and lead single crystal cathodes.

* * *

During the first quarter of 1961, production of motorized fire apparatus by U. S. manufacturers totaled 588 units. Production included 505 pumpers and 45 aerial apparatus.

* * *

The behavior of oxygen and carbon during the vacuum induction melting of iron is examined in a Navy research report. Also available is a report on vacuum induction melting of high-strength steels.

* * *

Compilations of data on the physical and mechanical properties of commercial molybdenum-base alloys and of tungsten and tungsten base alloys are presented in two reports.

* * *

The use of radioactive iodine vapor to determine the surface roughness of gold, brass, and aluminum is described in a research report. Also available is a research report on polarization capacitances of metallic surfaces.

Two-Plys Popular

Firestone Tire & Rubber Co. has announced plans to produce two-ply tires for next year's models of several standard sizes of automobiles, as well as most compact cars.

The company is producing two-ply tires as original equipment for some of this year's compact models, and since 1955 has made hundreds of thousands of the tires for small, lightweight European cars.

President Raymond C. Firestone said the two-ply tires for American cars will have four-ply ratings in all sizes manufactured, and will carry the same road hazard guarantees as their four-ply counterparts.

The company has introduced several innovations in the construction of the two-ply tire, according to Mr. Firestone. These include a new method of locking the beads into the tire, a layer of red rubber between the tread and cord body to warn motorists when treads are worn, nylon reinforcement, a new curing process, stronger body cord and a new tread rubber.

New Tire Available

A new, premium passenger tire that has polybutadiene synthetic rubber in the tread and is said to give approximately 60 per cent more mileage than first-line tires, has been introduced by United States Rubber Co.

The company said it is the first use of polybutadiene, known for its high abrasion resistance, in passenger tires. The new polymer is blended with styrene butadiene synthetic rubber, a conventional tire rubber.

Expendable All-Plastic Army Vehicle Has Hydraulic Motor at Each Wheel

(*Continued from page* 25)

"ride" can be adjusted either "hard" or "soft" by the air pressure in the springs. Standard automotive rubber bumpers take up the bump and rebound in the suspension.

Plastic Fuel Tanks

Plastic materials also are used for fuel tanks, hydraulic tubing and wheels in the Fox.

Specifications include: Weight with driver—1200 lbs; highway payload—1000 lbs; cross country payload, 500 lbs; land speed, 50 mph; water speed six mph; wheelbase, 73 in. and turning radius, 17 ft.

The term "expendable component" has been applied to the Fox since damaged parts, including the engine, can be replaced more economically than they can be repaired.

The Fox is the first in a planned series of expendable military trucks. The information obtained from the first Fox to be tested will have much bearing on whether this line of research will be continued.

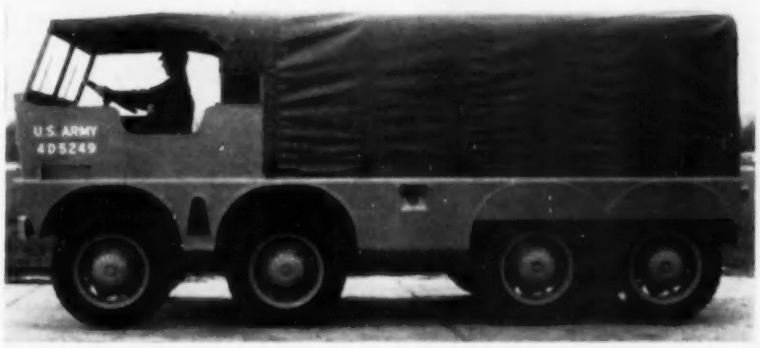
Ford's Test Track

A simulated automobile test track on the grounds of the Ford Rotunda in Dearborn, Mich., has been opened to the public for the summer.

The track is designed to demonstrate the performance of cars under test conditions and includes stretches of corduroy, cobblestone and gravel pavement, chuck holes, railroad crossings, body-twist bumps, a test hill with 16 and 30 per cent grades, a speed-up strip, and a banked turnaround loop.

The Rotunda, which is also the starting point for tours of Ford's Rouge manufacturing area, is currently observing the 25th anniversary of its opening as a permanent exhibit building.

ALUMINUM VEHICLE VIRTUALLY UNSINKABLE



The XM-521, research truck built by the Evansville Defense Div. of Whirlpool Corp. under direction of the Army Ordnance Tank Automotive Command, can carry 5000-lb payload while travelling up to 55 mph on land and 5.2 mph in water. Buoyancy is provided by unitized body, Kaiser aluminum honeycomb panels, and polyurethane foam in wheel well sponsons. It weighs 5000 lb.

Goodyear Radomes

Goodyear Tire & Rubber Co. has announced that it will build nearly $750,000 worth of inflatable radomes for use by the Air Force and the Marines in two highly tactical radar systems.

Designed by Westinghouse Electric Corp. these radar systems featuring the "Paraballoon" air-supported antenna can be moved by helicopter to mountain tops or other remote locations for tactical advantage in surveillance and detection.

Contracts to build 24 radomes have been signed with Electronics Div. of Westinghouse, according to E. M. Eickmann, general manager of Goodyear's Aviation Products Div.

87,099 Imports Noted

During the first four months of 1961, 87,099 new passenger cars valued at $96 million were imported into the United States. Of this total, 70,567 were made in West Germany.

Trucks, buses and chassis imported during the same period numbered 4875 with a total value of $5.6 million. West Germany also was the leading producer in this field with 4484 units.

Sealed Power Marks 50 Years of Service; $1 Million Research Center Dedicated

Sealed Power Corp. celebrated its 50th year of service to the automotive industry in June and also dedicated its new $1 million research center at Muskegon Heights, Mich. The company supplies piston rings, pistons and cylinder sleeves to engine manufacturers.

With introduction of this new facility, Sealed Power is in a position to conduct research programs more efficiently and more thoroughly than ever before.

Equipment and instruments of the latest type are available to scientific workers. The center boasts a complete chemical and metallurgical laboratory as well as facilities for physical testing.

New Plating Techniques

The laboratory contains tanks and instruments for experimental electroplating. This equipment will be invaluable in projecting studies of new plating techniques and coating materials required for heavy duty, high performance engines.

The laboratory also has eight modern engine test stands with dynamometer equipment ranging in capacity from 150 to 600 hp.

There also is an indoor service garage capable of handling motor cars and the largest trucks.

Sealed Power piston rings are made in more than 15,000 sizes and types, ranging from 15/16-in. to 29 in. in diameter. Sleeve sizes run from two in. to 8½ in. in diameter; pistons from two in. to 10 in. in diameter.

Sealed Power also is a major producer of pistons, rings, sleeves and other replacement parts. In fact, about 50 per cent of its business is in this field. Recently, the company has concentrated on large fleet operators. To reach this important group, Sealed Power has assigned contact engineers who call on fleet operators in the same way the engineering staff has called on OEM customers.

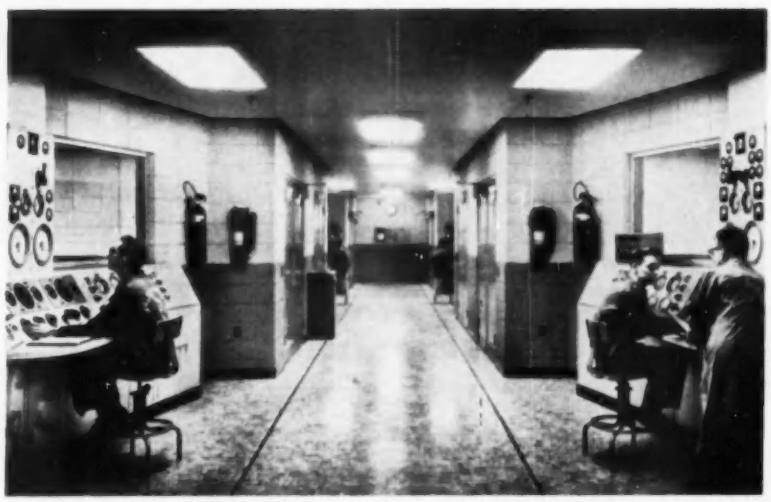
Personalized Service

This provides an unusual personalized service and makes it possible to study the problems of individual operators. In some instances, this may result in producing special designs for a large user.

At a press conference, many projects to meet the requirements of a new generation of engines were discussed. One is a study designed to develop new materials for compression rings to minimize blow-by and at the same time to reduce groove pounding and wear. Other projects are under way to find materials that will withstand higher temperatures and higher pressures.

Self-lubricating rings are being studied for Diesel engines and compressors. This has been achieved for moderate temperatures and power output, but higher temperatures and higher pressures are in the offing and these new requirements must be met in the near future.

Much work also is being done on studying the behavior of sealing rings for automatic transmissions. To this end Sealed Power has devised instruments to study sealing rings under conditions simulating actual service. Other projects include a study to improve oil economy and durability through improved and more efficient rings.



Sealed Power's Test Cell Corridor

Force Finds Jobs

Ford Motor Co. has reported that "virtually all" of the 1468 persons employed at its Chester, Pa., assembly plant when it shut down last March 15 have found new jobs or are drawing company-paid benefits.

Ford said 379 workers accepted jobs with the company at other locations. About 540 chose to receive separation pay.

About 125 former employes retired and 220 others are drawing supplemental unemployment benefits.

Zinc Institute Elects

F. R. Jeffrey, president of National Zinc Co., Inc., has been elected president of the American Zinc Institute.

INDUSTRY STATISTICS

By Marcus Ainsworth, STATISTICAL EDITOR

WEEKLY U.S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending July 15	Weeks Ending July 8	Year to Date 1961	Year to Date 1960
PASSENGER CAR PRODUCTION				
Total—American Motors	9,360	8,192	198,322	299,875
Chrysler	2,036	1,235	50,012	52,201
De Soto				16,150
Dodge	4,145	2,871	79,157	257,677
Imperial	151	94	3,872	8,063
Lancer	1,543	943	24,812	
Plymouth	4,872	2,842	97,129	154,898
Valiant	2,983	2,008	67,028	165,880
Total—Chrysler Corp.	15,730	9,993	322,010	655,469
Comet	4,795	3,761	98,513	78,685
Falcon	12,108	9,293	275,739	272,481
Ford	19,493	11,014	450,265	586,098
Lincoln	613		16,166	11,296
Mercury	2,921	1,736	56,722	94,903
Total—Ford Motor Co.	39,930	25,804	897,405	1,043,464
Buick	4,719	3,156	97,953	172,951
Buick-Special	2,472	1,457	47,419	56
Cadillac	2,873	2,031	89,376	97,405
Chevrolet	29,975	20,100	708,767	1,031,878
Corvair	7,514	4,965	197,151	153,725
Oldsmobile	6,071	4,448	131,811	226,823
Oldsmobile F-85	1,320	1,028	35,291	107
Pontiac	4,561	3,022	127,736	275,253
Tempest	2,637	1,673	67,482	
Total—General Motors Corp.	62,142	41,900	1,902,986	1,958,198
Total—Studebaker-Packard Corp.			29,527	67,249
Checker Motors	103	73	3,120	4,205
Total—Passenger Cars	127,265	85,962	2,953,370	4,028,460
TRUCK AND BUS PRODUCTION				
Chevrolet	7,604	5,015	187,438	251,457
G. M. C.	1,362	838	37,098	64,888
Diamond T	46	31	1,006	1,684
Divco	60	36	1,244	2,292
Dodge and Fargo	1,513	1,171	38,834	45,562
Ford	7,648	5,105	186,092	208,582
F. W. D.	23	12	465	587
International	2,917	2,352	80,632	75,706
Mack			5,201	8,561
Studebaker			3,875	8,943
White	283	268	9,552	10,444
Willys	1,678	584	63,037	81,832
Other Trucks	80	80	2,160	2,813
Total—Trucks	23,214	15,492	614,634	763,361
Buses	70	38	2,042	2,328
Total—Motor Vehicles	150,549	101,492	3,570,046	4,794,139

NEW FOREIGN CAR REGISTRATIONS*

MAY

1961		1960	
Volkswagen	14,806	Volkswagen	12,064
Renault	3,846	Renault	5,652
English Ford	1,377	Opel	2,782
Fiat	1,311	English Ford	2,081
Mercedes Benz	1,146	Fiat	1,892
Triumph	1,028	Austin Healey	1,881
Metropolitan	980	Triumph	1,793
Volvo	917	M. G.	1,435
M. G.	914	Peugeot	1,321
Austin Healey	840	Simca	1,298
All Others	7,209	All Others	12,014
Total	34,374	Total	44,213

FIVE MONTHS

1961		1960	
Volkswagen	71,790	Volkswagen	64,033
Renault	15,799	Renault	32,870
Fiat	5,483	Opel	13,132
Mercedes Benz	4,853	English Ford	12,986
English Ford	4,790	Fiat	10,607
Opel	4,444	Simca	7,218
Volvo	4,090	Triumph	7,145
Triumph	4,066	Austin Healey	7,074
Austin Healey	3,546	M. G.	6,080
Simca	3,402	Vauxhall	6,021
All Others	30,888	All Others	57,697
Total	153,151	Total	224,863

TRACTOR SHIPMENTS

WHEEL TYPE

Hp Ratings	May	Five Months
9-34 belt hp.	2,293	10,793
35-39 belt hp.	2,725	14,897
40-44 belt hp.	1,510	8,792
45-49 belt hp.	1,582	10,097
50-59 belt hp.	3,721	19,662
60 belt hp. and over	5,628	34,233
Total—Wheel Type	17,469[1]	98,474[2]

TRACKLAYING TYPE

25-29 net engine hp.	583	3,835
60-129 net engine hp.	487	2,574
30 net engine hp. and over	678	2,874
Total—Track Type	1,748[3]	9,283[4]

[1] Valued at $43,209,000
[2] Valued at $248,335,000
[3] Valued at $22,179,000
[4] Valued at $103,619,000

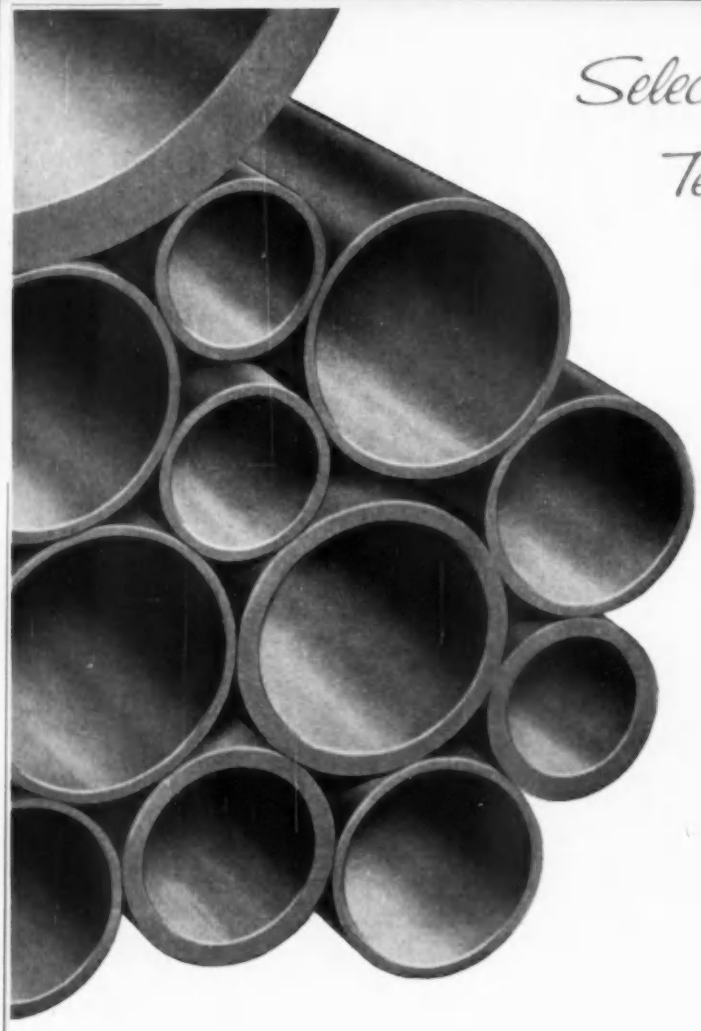
1961 NEW REGISTRATIONS*

NEW CARS

Make	May 1961	April 1961	May 1960	Five Months 1961	Five Months 1960
Chevrolet	151,316	130,680	171,779	628,987	730,689
Ford	129,568	107,642	131,721	527,813	611,821
Pontiac	33,050	31,420	39,875	147,655	173,623
Rambler	32,585	29,877	43,822	141,528	179,570
Oldsmobile	28,377	26,022	33,660	126,380	150,774
Plymouth	27,537	27,175	46,016	123,942	197,096
Buick	25,805	24,406	25,736	111,046	113,898
Dodge	21,256	21,841	39,356	93,717	156,145
Comet	18,319	14,586	17,253	70,618	37,706
Cadillac	12,777	12,324	12,875	61,262	65,008
Mercury	10,741	9,901	14,280	48,120	69,217
Chrysler	8,286	8,436	7,573	36,736	34,468
Studebaker	7,100	7,203	11,049	31,336	49,870
Lincoln	2,646	2,353	1,847	13,080	10,499
Imperial	828	944	1,274	4,664	7,123
Misc. Domestic	728	790	3,280	3,876	17,382
Foreign	35,240	32,344	45,623	156,609	229,698
Total—All Makes	546,173	487,973	647,055	2,326,969	2,834,787

NEW TRUCKS

Make	May 1961	April 1961	May 1960	Five Months 1961	Five Months 1960
Chevrolet	29,065	24,299	31,261	119,084	137,817
Ford	27,372	23,511	28,190	115,249	122,352
International	10,576	9,257	11,013	40,582	47,888
G. M. C.	8,392	5,642	8,292	27,596	33,400
Dodge	3,837	3,399	4,098	15,858	18,394
Volkswagen	2,356	2,171	2,874	10,011	13,005
Willys Truck	1,414	1,285	1,542	7,478	7,992
White	1,455	1,084	1,644	5,263	6,657
Willys Jeep	882	614	930	3,712	4,035
Mack	853	866	1,117	3,684	5,008
Studebaker	619	491	689	2,329	1,731
Diamond T	147	145	250	735	1,184
Brockway	68	50	120	348	514
All Others	724	760	1,440	3,488	6,266
Total—All Makes	85,730	73,574	93,460	355,417	406,443



Selection of finest raw materials

Testing every step of the way

Inspection to rigid standards

Assure 100% dependability for

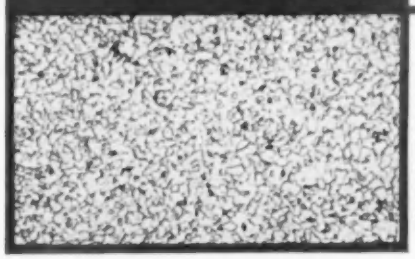
OHIO WELDED PRESSURE TUBING

You can be sure — doubly sure — of utmost tubing dependability when you specify Ohio Welded Pressure Tubing — *made by Ohio Seamless.* First, Ohio works to accepted industry standards — ASTM, ASME, and similar Federal and military specifications covering welded pressure tubing. Second, Ohio Welded Pressure Tubing is produced under a *continuous* process of quality control — not just a final test inspection to cull questionable material.

Carefully selected prime raw material is slit, edged, shaped and electric resistance welded on the most versatile and modern equipment in operation. At each and every step of the way Ohio Welded Pressure Tubing is under the scrutiny of Ohio's master tubemakers . . . making control tests at frequent intervals . . . testing random samples from each production order far beyond the limits of the usage involved.

For critical pressure piping applications . . . for condensers, heat exchangers, boilers and superheaters — in the range of sizes from ½ to 7½" OD and wall thicknesses from .028 to .375"— mark your prints "*Ohio Custom Made Welded Pressure Tubing.*" There is no equivalent.

Photographs show flare, flattening and crush tests performed continuously on every order. Non-destructive tests include air, water, magnetic, eddy current and visual inspection to insure 100% dependability.



Photomicrograph of polished and acid-etched surface shows perfect microstructure of normalized Ohio Welded Pressure Tubing. Weld area running down the center is now indistinguishable and tube has become, in every sense, weldless.

OHIO

OHIO SEAMLESS TUBE

Division of Copperweld Steel Company

SHELBY • OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

Representatives in principal cities. Check leading directories:
THOMAS', MacRAE'S, CONOVER-MAST, SWEET'S, FRASER'S.

A-4[illegible]

MEN IN THE NEWS

Ford Motor Co., Tractor Operations — R. E. Hunt has been named general manufacturing manager.

Morton Mfg. Co.— Sherwood J. Basch has been promoted to vice president-engineering.

Screw and Bolt Corp. of America — Timothy E. Griffin has been appointed assistant manager-automotive sales.

Allis-Chalmers Mfg. Co., Engine - Material Handling Div. — John W. Carlson has been appointed general manager.

Motec Industries, Inc. —William S. Coleman, Jr., has been appointed chief administrative engineer.

Warner Electric Brake & Clutch Co.— Siegfried Nuber (far left) has been named supervisor-research and development. D. T. Axon has been appointed manager, facilities planning dept., Automotive Assembly Div., Ford Motor Co.

Gabriel Co.—**Thomas J. Dolan** has been elected chairman of the Executive Committee.

Chrysler Corp.—**William S. Blakeslee** has been promoted to group executive-defense and **Elmo L. Joseph** has been named national used car manager.

Joseph T. Ryerson & Son, Inc. — **Donald E. Woodruff** has been named assistant general sales manager.

General Motors Corp., Fisher Body Div.—**Clyde H. Schamel** has been promoted to senior engineer in charge of the Experimental and Development Dept.

Willys Motors, Inc.—**C. M. Ritchey** has been named director of advertising, merchandising and public relations.

Highway Trailer of California — **Glenn M. Kirk** has been named plant manager.

B. F. Goodrich Co. — **Henry P. Stockbridge** has been named director of new product planning.

Motec Industries, Inc.—**George D. Dodson** has been promoted to director, Parts and Service Div. and **Arthur E. Smith** has been named director, Merchandising and Customer Services Div.

Crucible Steel Co. of America — **Anthony Sarkis** has been appointed traffic manager.

Chrysler Corp., Chrysler and Imperial Div. — **Gordon H. Barnes** has been promoted to sales promotion manager.

Cessna Aircraft Co. — **Robert M. Bauer** has been named corporate comptroller and assistant treasurer.

Tecumseh Products Co., Lauson-Power Products Div.—**Dr. Frank E. Schwartz** has been named engineering director.

Stewart-Warner Corp.—**Charles A. Stone** has been promoted to marketing manager.

Chrysler Corp.—**A. N. Cole** has been promoted to treasurer-comptroller, Chrysler International S. A.

Ford Motor Co., Lincoln-Mercury Div.—**Carl B. Pfeiffer** has been promoted to current model planning manager and **Ralph L. Peters** has been named advance model planning manager.

Taylor Fibre Co.—**George J. Muller** has been named manager, Special Projects Group.

Necrology

David B. Ireland, Sr., board chairman and president of Wolverine Bolt Co., died July 12 in Detroit.

Brig. Gen. Theodore H. Dillon, deputy chief of the Army Transportation Corps in World War II, died July 10 in St. Petersburg, Fla.

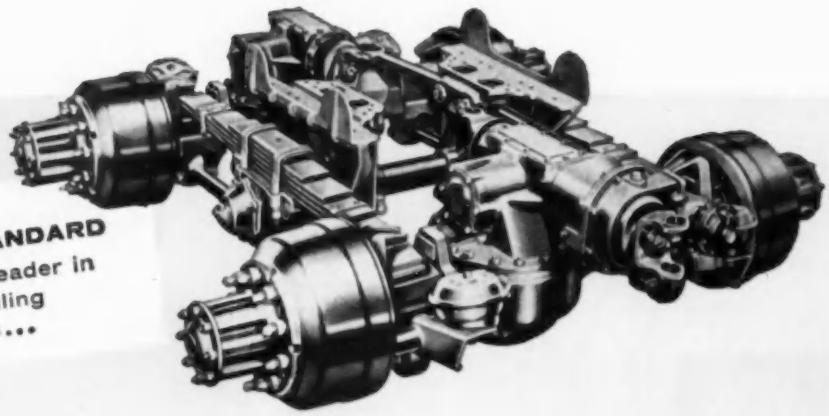
Joseph N. Prentis, 70, retired chassis engineer at Cadillac Div. of General Motors Corp., died in Wyandotte, Mich.

Thomas F. Stapleton, 60, chief of the legal section of the Ordnance Tank Automotive Command, died July 3 in Belle River, Ont.

Donald B. McPhail, 66, retired director of the general office and field accounting for the Fisher Body Div. of General Motors Corp., died July 2 in Grosse Point Park, Mich.

Dan L. Newkirk, 73, retired superintendent of blast furnaces and coke ovens for Ford Motor Co., died July 2 in El Paso, Tex.

William S. Wolfe, 70, retired director of production for all U. S. plants of Goodyear Tire & Rubber Co., died June 30 in Delray Beach, Fla.



ROCKWELL-STANDARD
Acknowledged Leader in
Rugged Hauling
Operations...

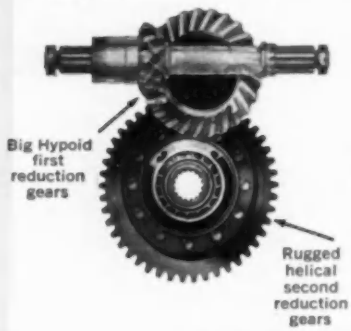
Here's why Timken-Detroit®

DOUBLE-REDUCTION TANDEMS LEAD IN TOP PERFORMANCE—LONG LIFE!

Timken-Detroit Heavy-Duty Tandems with Hypoid Helical Double-Reduction Gears are the big favorites for top performance and long life.
Here are some of the reasons why:

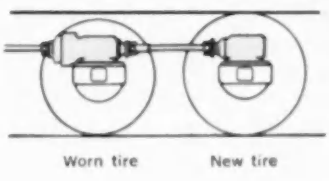
Rugged Hypoid-Helical Double-Reduction Gearing!

Balanced gearing—with two full-sized gear sets working in series to take an equal share of the load—provides a stronger power train with balanced gear set loadings and the widest range of ratios.



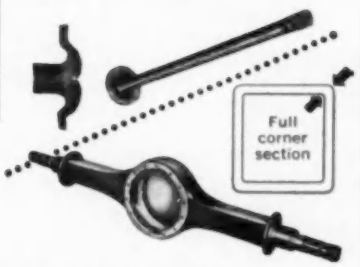
Driver Controlled Interaxle Differential!

Allows differential action between the axles to compensate for worn or mismatched tires. Both axles do equal amounts of work . . . can be disengaged at any speed, giving positive through drive when better traction is needed. *Straight-Line Through Drive* eliminates prop shaft angularity . . . increases bearing and gear life, reduces maintenance.



"Torsion-Flow" Axle Shafts and Hot-Forged Housings!

More splines, Torsion-Flow forging, and patented heat-treating processes make Rockwell-Standard shafts the toughest in the industry. Housings are hot-forged from high carbon steel, and are rectangular shaped with full strength corners for greatest strength with minimum weight.



Timken-Detroit Double-Reduction Tandems come in a wide range of capacities—6 models from 34,000 to 65,000 pounds.

Another Product of... **ROCKWELL-STANDARD CORPORATION**

Transmission and Axle Division, Detroit 32, Michigan

an Editorial

Time to Re-evaluate Your Plans

POSSIBLY MOST OF OUR READERS have revised some plans recently. A big reason for doing so exists now. On June 29th President Kennedy signed the Highway Act of 1961 assuring completion of the nation's 41,000-mile Interstate Highway System by 1972. More than 11,000 miles of the system have been built. The remaining 30,000 miles of the system will be built steadily in every State over the next decade. This vast addition to highway facilities means that more trucks, buses, passenger cars, tractors and trailers, military vehicles and other vehicles will be needed to move the people and products which will traverse these roads.

IT IS ESTIMATED THAT the new highway system will save at least 6000 lives a year when completed, rather than the 4000 lives a year originally anticipated. It is reported that $50 million will be allocated by the Federal Government for a full-scale test of the feasibility of automatic highways. This test will provide automatic control of cars that will use this test area with the government supplying the special equipment for the program. The equipment, which will control steering, acceleration, and braking, it was reported, will be attached to the undercarriage of cars when they enter the highway and will be removed at the end of the test section. Speeds approaching 100 miles an hour could be achieved with safety, we are told.

WHAT DOES THIS MEAN TO YOU? What does it mean to metals producers? What does it mean to the electronics and electrical control industry? What does this mean to motor vehicle producers?

IT MEANS SIMPLY THAT AMERICA is not going to get hog-tied with inertia and obsolescence in its transportation problems. Industry and government are joining hands to design and capture real progress. If your future is linked with either the automotive manufacturing or supplying fields, it means that you have greater opportunities ahead than you had in the past. What are you going to do about this? If you do not have a plan now, perhaps you had better create one. Your future may be greater than you think. Why not find out as soon as possible?

Hartley W Barclay

Editor and Publisher

Stronger bumpers that cost no more...look better ...made of USS Par-Ten High Strength Steel

Both front and rear bumpers of 1961 models such as these contain high strength steel. Significantly, more than half the American automobiles built in 1961 have high strength steel in their bumper assemblies while the balance use carbon steel.

Here's a special high-strength low-alloy steel that has everything you need for better automobile and truck bumpers—40% greater strength than ordinary carbon steel, higher resistance to impact, and a surface that takes an excellent chrome finish. You can *sell the shine* like the sizzle of a steak!

USS PAR-TEN High Strength Steel has a typical yield point of 45,000 psi. Bumper weight can be reduced as much as 20% without loss of strength. Less weight means greater efficiency, more design flexibility.

USS PAR-TEN High Strength Steel was developed especially for bumpers, bumper guards and similar high-finish uses. This economical, easy-to-form steel retains its superior surface characteristics even after severe grinding. The defect-free surface holds a uniform, tightly adherent chrome plating that lasts longer without pitting. Equally important, because of USS PAR-TEN Steel's greater strength, it provides increased resistance to impact and denting.

This mark tells you a product is made of modern, dependable Steel.

For more information, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS and PAR-TEN are registered trademarks.

TYPICAL MECHANICAL PROPERTIES-USS PAR-TEN HIGH STRENGTH STEEL
.180" and under in thickness

Yield Point, Psi	45,000
Tensile Strength, Psi	62,000
Elongation in 2", Per Cent	29
Cold Bend—180°	Flat

ASTM Standard specimens, minimum number of tests and ductility modifications apply.

United States Steel Corporation • American Steel and Wire Division • Columbia-Geneva Steel Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company

United States Steel USS

AUT

F. Kermit Donaldson, Executive President, Steel Founders' Society of America

Automotive Uses of Steel Castings Increased 74%*

Every major segment of the automotive industries showed advances in steel castings used during 10-year period

By

F. Kermit Donaldson
Executive Vice President
Steel Founders' Society of America

THE use of steel castings in the automotive industries has climbed steadily since vehicles and equipment powered by internal combustion engines made their appearance in appreciable numbers near the turn of the century.

Modes of transportation and movement of goods have changed, however, and as the steel casting industry observes its Centennial in the United States this year, steel castings used in motor vehicles, agricultural and construction equipment, and ordnance rank second only to the first and still largest market for castings—the railroads.

While those first uses of steel castings in the automotive industries were undoubtedly experimental and sporadic, such is not the case today. The market is firm and expanding rapidly.

The steel casting industry has an annual capacity of 2½ million net tons and employs more than 50,000 persons in more than 240 commercial steel foundries. Member foundries of the Society account for approximately 90% of the commercial steel casting production in the United States.

The Automotive Market

Latest complete figures compiled by the Steel Founders' Society show that in 1959 automotive industries accounted for 26.8% of the total market for steel castings. Indicating the rapid growth of the market is a comparison of the 1959 figures with the 10-year period of 1950-59. This 10-year average figure for the automotive industries was 23.71%, with the pick-up coming in the late 50's.

The comparison shows an increase in every segment of the automotive industries except military vehicles and a tremendous increase in highway type motor vehicle castings.

*The 10-year average figures reveal that motor vehicle casting accounted for 4.17% of the total market, but in 1959 they jumped to a startling 7.28% of the total market. This is equal to a 74% increase in percentage of the market use during this period.

Obviously, there must be reasons for the accelerated use of steel castings in the automotive industries. Although a myriad of factors are involved in any market shift, we feel that the increased use of castings in the automotive field can be attributed to three facts.

The first—and the one the Society and its members had little or no control over — is the ever-increasing use of vehicles powered by internal combustion engines. Not only has this increased the market for castings in the automotive industries, it has improved the relative position of the automotive field as a market for steel castings.

Wilson H. Moriarty, President
First Vice President & Group Executive, The National Malleable and Steel Castings Company

The other two reasons for the increased use of steel castings in the automotive field can be traced to efforts on the part of the steel casting industry and the Society. Steel castings have always had certain advantages over competitive engineering materials. Largely through the efforts of SFSA have these advantages been refined, added to and brought to the attention of end product manufacturers.

Two of the major items supplied the automotive industries by steel foundries are axle housings and truck fifth wheels. Both, of course, are made in a variety of sizes and are designed to insure a minimum of maintenance on heavy equipment.

Advantages of Steel Castings

Just how do steel castings stack up when compared to alternate methods of producing components? It is irrefutable that steel cast to shape is the most direct method of producing steel parts to final form, still retaining all the advantages of steel. A virtually unlimited range of shapes, many economically unobtainable by other methods, are available by casting in steel.

Steel castings offer this same versatility metallurgically. A large portion of modern steel castings are parts that have severe dynamic service requirements. The metallographic structure of steel castings is uniform in all directions, and a wide range of mechanical properties are available.

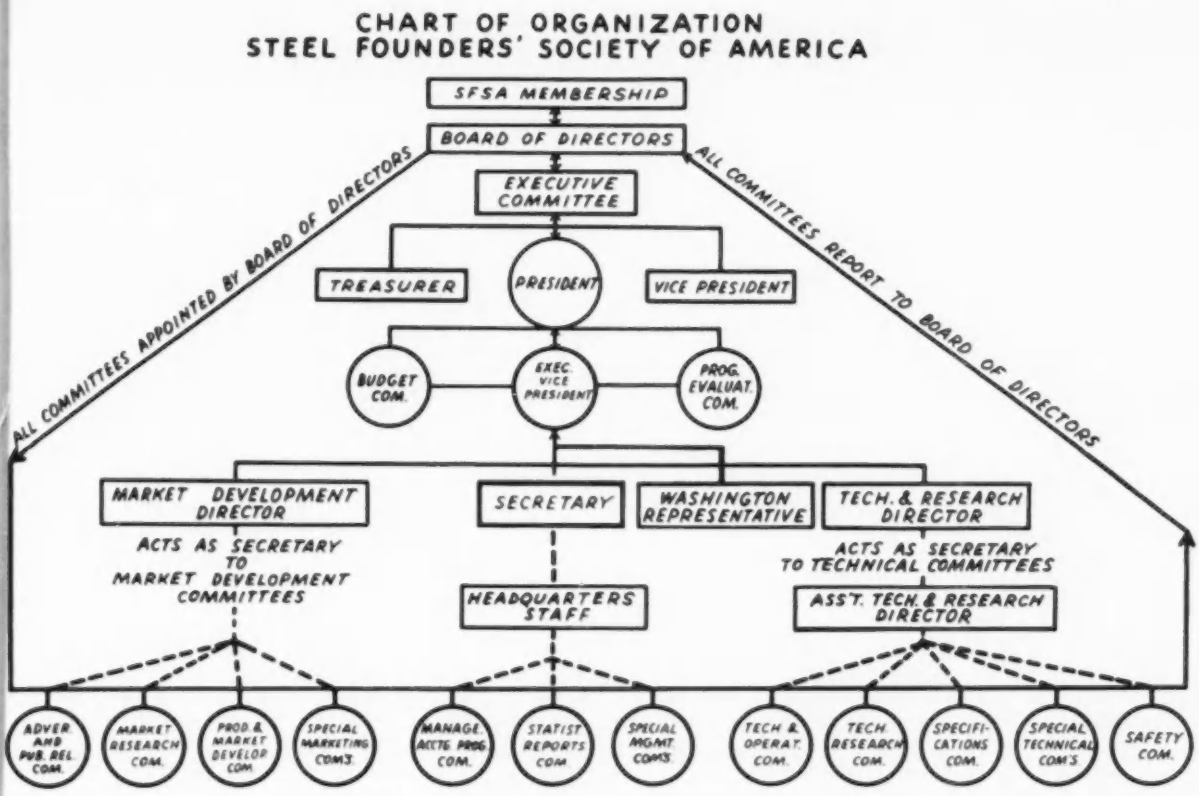
The increased production by U. S. foundries of fully heat treated high tensile steel castings has been a factor in the growing use of steel castings in the automotive field. Some materials being cast today have tensile strengths up to 300,000 psi and more than 15% of the steel castings produced in 1959 had a tensile strength of more than 90,000 psi.

The big advantage, of course, is economy. Because casting in steel is the most direct method of producing parts to final shape, integral one-piece components are possible, thus assembly costs are drastically reduced.

Aiding the Automotive Industries

Research carried on by the Society since 1942 has improved the quality of steel castings, increased the range of mechanical properties, opened new frontiers in production methods and developed basic technical information for new markets and new applications. The Society's technical staff and the Technical and Operating Committee has directed several basic research projects and the published reports have been made available to member foundries for practical application in improving the properties and production of steel castings. Constant study and preparation of new steel casting specifications and revision of existing specifications is a regular service. In addition, a national conference — attracting nearly 500 technical and research men in the industry—is held annually and district meetings of technical and operating executives of the industry are held on a regular basis. These conferences provide industry personnel with up-to-date technical data of value to member foundries and their customers.

The spark and drive needed to bring the advantages of steel castings to the attention of end product manufacturers, including those in



the automotive industries, has been provided by the Society's market development staff and committees. SFSA carries on a concentrated market development program through regional marketing conferences, yearly surveys of steel castings in 54 market groupings, and regular market research reports to members. A quarterly Product and Development Letter keeps industry sales engineers

Steel Casting Industry • • Dates & Data

The steel casting industry was founded in the United States with the pouring of some crucible castings in Buffalo in 1861 by the Buffalo Malleable Iron Works, a company that is still in existence as the Pratt & Letchworth Division of the Dayton Malleable Iron Company.

In 1867, the first steel castings of commercial value were poured by the William Butcher Steel Works in Philadelphia, and in 1871 the first company was established exclusively for manufacturing steel castings—the Pittsburgh Steel Casting Co., Pittsburgh, Pa. This company produced castings for agricultural equipment and for a dozen years after its founding manufactured 98% of the steel castings made in the U. S.

Here are some facts about this 100-year-old industry, provided by its national association—the Steel Founders' Society of America:

Steel Casting Processes:	**Sand, Centrifugal, Shell, Ceramic, Various Investing Processes, Semi - Permanent Graphite Molds.**
Range of Sizes:	**From less than an ounce to 254 tons.**
Capacities:	**Approximately 2½ million net tons annually.**
Number of Foundries:	**Approximately 240 commercial steel foundries in the United States and 33 in Canada.**
Number of Employees:	**Approximately 50,000.**
Locations of Foundries:	**In 32 states with maximum concentration in and near Buffalo, Philadelphia, Pittsburgh, Columbus, Chicago, Milwaukee, St. Louis, Los Angeles, and Seattle.**

Robert M. Shumo,
Vice President &
Director of Division 1

President, Pennsylvania Electric Steel Casting Company

R. G. Parks, Treasurer

Treasurer, National Malleable and Steel Castings Company

N. K. Daerr, Director of Division 2-4

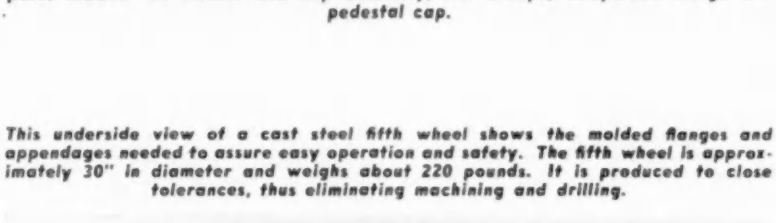
Vice President-Sales, Fort Pitt Steel Casting Division of Pittsburgh Steel Foundry Company

John A. Ross, Director of Division 3

Secretary - Treasurer, Dibert, Bancroft & Ross Co., Ltd.

This overall view of a rear axle assembly for a heavy-duty truck shows the cast steel rear axle wheels, each of which weighs 1530 pounds. Both the flange half and hub half of the differential case are made as steel castings. Other cast steel parts include the carrier and cap assembly, rim clamps, companion flange and pedestal cap.

This underside view of a cast steel fifth wheel shows the molded flanges and appendages needed to assure easy operation and safety. The fifth wheel is approximately 30" in diameter and weighs about 220 pounds. It is produced to close tolerances, thus eliminating machining and drilling.



abreast of developments in the field and Product Development Contests are held every three or four years. The fourth such contest, with $10,000 in prizes, is being held this year as part of the Centennial activities. The contests are open to college engineering students and employees in customer industries. New and re-designed products made of steel castings are entered and the Society develops the winning entries into direct mail pieces and other promotional literature to illustrate the advantages of steel castings in a variety of applications.

In short, the Steel Founders' Society provides vital technical and marketing information and leadership and the individual steel foundries work directly with their customers in the automotive industries. This, we feel, places the burden for broad technical and marketing data with the association but leaves the specific application of such information where it belongs —with the individual member foundry. It is simply a case of each partner doing what he is best equipped to do.

What the Society's partners—our member foundries — have accomplished in the automotive industries by imaginative application of SFSA technical and marketing guidance is best illustrated by a few representative cases which are illustrated in this article.

W. P. Dudley, Executive Committeeman & Director of Division 5

Vice President, Ohio Steel Foundry Company

R. C. Wood, Director of Division 6

President, Minneapolis Electric Steel Castings Company

J. F. Eberle, Director of Division 7

Executive Vice President, Missouri Steel Castings Company

M. R. Atwater, Director of Division 8

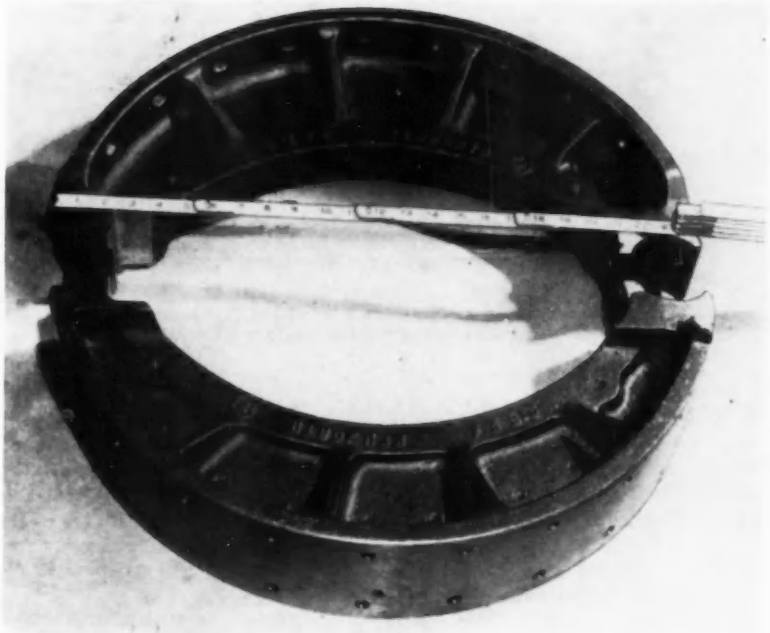
Vice President & Manager of Sales, Kay-Brunner Steel Products, Inc.

Association Structure

The Steel Founders' Society of America is the national association for steel foundries producing approximately 90 per cent of the steel castings sold in the U. S. and Canada. More than 130 foundries are members of the Society, a nonprofit and unincorporated association founded in 1902—one of the oldest trade associations in the United States.

One director from each of the eight geographical divisions is elected for a two-year term. The Board of Directors administer the Society, appoint all committees, and annually elect a president, vice president, executive committee member, treasurer, and four staff members headed by the executive vice president. The executive committee member, president and vice president, form the Executive Committee.

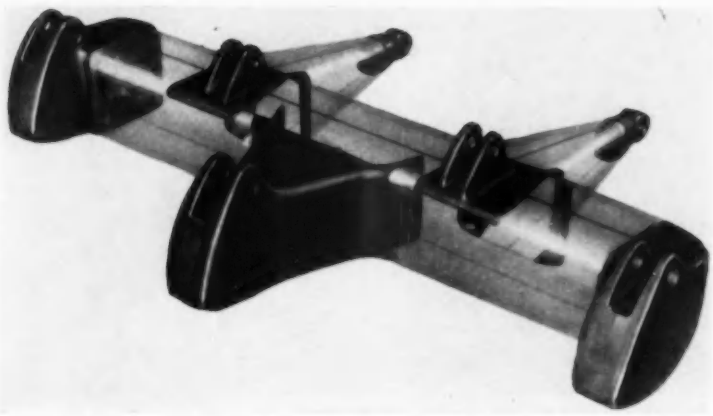
Society activities are broken into



Fragmentation of brittle brake bands presented a problem to the manufacturer of a two-axle, 36-ton rock hauler. The fragmentation—and problem—resulted from use of fabricated brake shoes that lacked the necessary rigidity.

Redesign of the brake shoes to cast steel resulted in elimination of the repair problem and a savings of 37%. Approximate outside diameter of the shoe is 24" and the weight of each half is 95 pounds. More than 8,000 pounds of components for the hauler — some with as much as 110,000 psi minimum tensile strength — are made as steel castings.

A crossmember for supporting the end-engine fan of an inter-city bus—originally produced as a 12-component fabrication—was the source of chronic breakage complaints. Through the teamwork of the bus manufacturer and a steel foundry, a one-piece steel casting was designed. Finished cost was reduced 33%, the strength of the part increased, appearance improved — and breakage complaints were completely eliminated. The same bus uses 18 other parts made as steel castings, including spring shackles, door hinge arms and spring pressure pads.



Composite Fabrication Using 11 Steel Castings Cuts Costs 50%, Reduces Weight 25%

(Photo shows crossmember in phantom, steel castings in detail.)

The manufacturer of a rock ripper, an independent engineering firm and a steel foundry combined efforts to design and produce this rock ripper as a composite fabrication.

Assembly of the component was greatly simplified by replacing as many as 12 plate parts in portions of the frame with one-piece steel castings. The design was entirely by mathematical analysis and the steel casting specification was ASTM A27-52T, Class 65-35, normalized and tempered. The wear on all shank contacting surfaces was practically eliminated because of the wear-resistance of steel castings.

The two mounting arms and the crossmember (all three shown transparent) each were made by welding four pieces of formed steel plate together. Assembly of the castings to the plate was speeded by casting in all weld chamfers. Curved surfaces were used to efficiently accommodate stresses and generally improve over-all appearance. Fillet castings were used to reduce stress concentrations at the juncture of the arms with the crossmember. Varying section thickness of the end and rear shank holders—determined through stress analysis—is economically possible only through use of steel castings.

Not only were manufacturing costs cut 50% and weight reduced 25%, the husky device was better able to withstand the shocks, overload and abuse of tough earth-moving assignments.

three general areas: Management, Technical and Research, and Market Development. A staff member is assigned to each of these three areas. The staff member acts as secretary to all committees appointed to serve in his area of activity.

Mr. B. P. Hammond, vice president of the Blaw-Knox Company and a dedicated steel foundryman, offered what I feel is the best summary of our Society in a speech given late last year. He said, in part: "It had its origin in the instinct of self-preservation . . . mutual advancement . . . and the common good. Founded upon simple lines, it is conducted with sanity and judgment . . . helpful to its membership and helpful to the public . . . consulted alike by those engaged in the industry it represents and by governmental agencies representative of the public it serves. All who deal with it are assured that its management is an open book and its conclusions . . . wherever given . . . the result of honest, painstaking and intelligent effort in a determined effort to live in the spirit of our motto "Integrity . . . Research . . . Progress."

Management Aids

In the area of management, compilation and dissemination of varied statistics pertinent to the industry is a prime function. Statistical reports include Monthly Statistical Summaries, Quarterly and Annual Earnings Reports, Annual Statistical Summaries, Monthly Quick Trend Reports and other special surveys.

Committees that operate in the general area of management are: Budget, Management Accounting, and Statistical Reports.

Committees that operate in conjunction with the technical section are: Handbook, Safety, Specifications, Technical and Operating and Technical Research.

Other Activities

All promotional activities of the Society are grouped under the market development section. In addition to the many activities aimed strictly at market development—and reviewed earlier in this article—the committees operating in this area use a variety of avenues to "make known the advantages of steel castings." Contact is maintained with more than 4,000 engineering professors, films are distributed, mailings are made to 46,000 customers and prospects, and advertising and public relations are employed extensively in market development activities.

Committees charged with helping find new markets and new applications for steel castings are: Advertising and Public Relations, Market Research, and Product and Market Development.

An indication of the importance of steel castings as a basic industry was the invitation extended by the Newcomen Society in North America to present a history of the industry at its annual Benjamin Franklin Birthday Dinner. SFSA was the first trade association selected by Newcomen to represent an industry and SFSA President Wilson H. Moriarty—who is first vice president and group executive of the National Malleable and Steel Castings Company, Cleveland—delivered the address in Philadelphia in January as the opening activity of the Centennial observance.

Steel Centennial—1961

The steel casting industry, in observance of its centennial in 1961, is introducing a new industry symbol.

The symbol will be adapted as a permanent benchmark for the industry by dropping the centennial reference at the end of the year.

Lines lead from a molecular structure to form the dominant letters of the symbol—"S C." The trademark, according to the Steel Founders' Society, exemplifies the outstanding characteristics of steel castings: strength, shape and design versatility. ■

Jack Ryan, 1960-'61 Chairman of the Automotive Division, welcomes guests

Automotive RELIABILITY '61

In 1961 there are 728 critical parts in a typical passenger car, compared with only 233 critical parts in 1930.

A report of the 1961 Automotive Division ASQC Conference at Detroit, Michigan

THE Fourth National Conference of the Automotive Division of The American Society for Quality Control was the first meeting of its kind sponsored by an industry devoted predominantly to consumer goods according to Edward J. Diggs, chairman of the transactions committee of the group. Brooke Westover of Chrysler Corporation was general chairman for the 1961 sessions, aided by David Dillingham of Detroit Transmission Division, General Motors Corporation, Max Clarkson, John Birecki and Howell Burke of Chrysler Corporation and Steve Adams of the Wolverine Tube Division, Calumet & Hecla, Inc.

National officers of the Automotive Division included John J. Ryan of the Pontiac Motor Division, G.M.C., Dale A. Cue of Hoover Ball and Bearing, as chairman and chairman elect, respectively. Other officers included Judson Jarvis of Wolverine Tube Division, Calumet & Hecla, Inc., and Louis Haydu of Ford Motor Co.

According to Lloyd M. Steward, Director of Reliability, A. C. Spark Plug Division of General Motors Corporation, "We have Engineering, Manufacturing, Purchasing and Quality Control all in the same boat, called

The Automotive Division Chairmen discuss the program — Dale A. Cue, 1961 - '62, Jack Ryan, 1960-'61 and Owen Keeler, 1959-'60

Reliability." It takes teamwork, he continued, to create the kind of Reliability that will give your product superior advantages over its competitor in the field.

In AC Spark Plug, Mr. Steward added, the Director of Reliability reports to the General Manager and is a member of his staff. Under this organizational setup, Reliability decisions are made without influence from either the engineering or production directions. Our concept and approach could be likened to a bridge. We feel that Reliability begins with the basic design supported by good engineering on the one end and on the other, by good manufacturing techniques. For example, one of our many functions is to provide reliable factual information to manufacturing, engineering and to purchasing. We feed back information to manufacturing concerning scrap costs and rejection trends hour by hour. For Engineering we provide Reliability attainment compared with the specified objective. For Purchasing we provide vendor ratings, and investigate sources of supply. To accomplish these things we must acquire a thorough knowledge of the entire system and installation procedures of which our product becomes a part. This "systems" concept is acquired by our Reliability and Quality Control representatives through their contacts with our equipment customers.

This daily exchange of information between these men through our Reliability Office and our weekly review meetings keeps us informed concerning any type of problem arising in the field. This "systems concept" approach has extended the scope of our work. To successfully predict reliability we must know the product environment from the time it is OK'd by the final inspector at the end of the production line, until it has been successfully operated for its intended life.

Listening Posts

Information used for such purposes comes from eight major sources. These include appointed field "listening posts" which report customer data from sixty strategic customer areas throughout the country. There are also factory contract reports, monthly product testing reports, life testing reports and United Motors Service summary reports. Other important sources of information include General Motors warranty reports, AC Divisional analysis reports and Equipment Customer reports.

Henry C. Bujak of Vickers stressed the need for "Absolute Reliability"

The answer to "Why companies invest in Reliability Programs," Mr. Steward emphasized, is "to keep up with progress. The demand by customers for products which will be trouble-free for their intended life, and their willingness to pay for predicted performance, is progress."

The Vickers program of Reliability was described in detail by Henry C. Bujak, Director, Quality Monitoring, Aero Hydraulics Division. Mr. Bujak pointed out that the basic approach to reliability just covered is generally applicable to most products in many fields of endeavor. However, the *extent* to which these concepts should be applied and the program set up to implement them may vary with the field of endeavor, the product, and the size of the company.

The governing principle of the program which we have adopted at Vickers is to take all possible action to achieve increasing reliability with absolute reliability as the goal. It involves a thorough and continuous repetition of the quality improvement cycle with specific functions which review designs, procedures, and field performance to anticipate potential causes for failure and correct them before failures can occur.

Since reliability is the concern and responsibility of each individual and each department contributing to the product, Engineering, Production, and Marketing share the responsibilities for:

(1) *Planning* actions and procedures which will make the desired level of reliability possible.

(2) *Revising* actions and procedures to improve the reliability of the product.

(3) *Evaluating and reporting* reliability attainment.

The program is divided into four phases: (1) Engineering, (2) Production, (3) Field Application, and (4) Monitoring. An outline of these

CHART A

VICKERS, INC. Reliability Program Outline

ENGINEERING PHASE

1. INITIAL REVIEW

A. System Review

The system is analyzed with respect to the specified parameters. Failure modes and consequences of failure are established. Consideration is given to safety measures and redundancies.

B. Component Review

The specified parameters of performance and environment are reviewed. Simplification and standardization are major considerations.

2. PRELIMINARY DESIGN

Development testing is conducted to study the life characteristics of various material configurations. Performance and extreme environmental testing are conducted; these tests are designed to enable the study of controlled factor effects (under accelerated conditions when possible). New designs incorporate adequate stress-safety margins substantiated by laboratory testing. The reliability of a new product remains theoretical until units have been built and tested and failures have been observed; consequently, the emphasis during development is toward accelerated test programs for the detection of "weak links." Subsequent endurance testing enables the establishment of service-life estimates. Reliability can be estimated with respect to time, using non-parametric statistics for the determination of confidence levels.

3. STABILIZED DESIGN

A. Design Review

The detailed design is assessed with regard to function, manufacture, and potential reliability (through the establishment of necessary stress factors and previous experience). A review being conducted by an independent analyst, whose findings are appraised in committee.

B. Maintenance Review

A service engineering study is conducted, incorporating field service experience.

C. Design Issue

Check forms, designed to prevent the incorporation of unreliable features, are employed as drawings are released. Critical characteristics are noted, to facilitate manufacturing conformance control through identified parts records.

4. PRE-PRODUCTION TESTING

Accumulation of data permits a first estimate to be made of the reliability achieved and provides the basis for a management decision for design release.

5. PRODUCT IMPROVEMENT

To incorporate effective corrective action for those rejected product or service failures proved to have been caused by improper, or inadequate specifications. To provide Engineering support to other departments whenever an investigation, or problem requires skills and equipment not available outside of the Engineering Department. To evaluate and improve product reliability through tests on experimental, prototype production, and production parts.

PRODUCTION PHASE

1. PRIOR TO PRODUCTION

A. Preliminary Specification and/or Drawings

Facilities are reviewed, relative to the projected workload. Orders are issued for the procurement of special machines, tools, and necessary equipment. "Bought-out" materials and parts are listed.

B. Sub-Contracted Parts Study

A study is made to insure that invitations-to-bid are adequately specified, and that the "accept-reject" criteria are defined.

C. Vendor Survey

The acceptability of subcontracted parts quality and delivery schedules is assessed. The sub-contractor's ability to uphold an adequate reliability policy is studied.

D. Production Planning

A preliminary chart of the projected production schedule is prepared. Processing, operational, and assembly instructions are prepared to assist in the maintenance of manufacturing conformance with specification.

E. Production Control

Conformance assurance stages, supported by all necessary inspection measuring devices, methods, and inspection test procedures are arranged to allow identification of all defect-free product and defective product. Arrangements are made to include the documentation for recording applicable special characteristics and/or detail part identification histories. To insure that customer required life test sampling procedures are planned.

2. PILOT PRODUCTION

A. Units are subjected to stage-by-stage quality examination to insure complete conformity with all specifications and approved practices.
B. Units are delivered to Engineering for pre-production test requirements.
C. The production schedule is finalized. Assessment for adequacy of the manufacturing and assurance controls is made.
D. The shipping specification is studied; packaging necessary to conform with transport and storage requirements is determined.

3. PRODUCTION RUN

It is the responsibility of the Plant Quality Analysis Group to:
A. Monitor the stage-by-stage production inspection (conducted to a defined acceptance criteria) and to demand documented approval of any deviation.
B. Conduct "Quality Audits" to insure that effectiveness of controls is maintained.
C. Accumulate production test data for statistical evaluation.
D. Submit evidence of the reliability achieved (where production life tests are specified).
E. Require determination of the cause of any non-conformity with reliability requirements.
F. Evaluate, and report effectiveness of corrective action by a "before" and "after" analysis.
G. Insure that all improvements and/or changes are incorporated in a product prior to release for shipment.
H. Insure that the finished product is packaged as specified, and that all necessary documents are included with the unit.

FIELD APPLICATION PHASE

Through direct contact with the end user, the Field Service Department is responsible for providing support, as outlined below, during pre-application usage and field application of the product.

1. PRE-APPLICATION USAGE

A. Provide any necessary installation details, as well as manuals, to aid in the optimum utilization of the equipment.

B. Instruct field support personnel in the maintenance and overhaul procedures required for the equipment.

C. Be available for advice as required, during complete system checkouts.

D. Request, and cooperate in arrangements for data recording interchange, and "feedback."

2. FIELD APPLICATION

A. Check the degree to which the original specifications cover the actual environment in which the product is to operate.

B. Quality Analysis to determine the the principal cause(s) of field problems by (1) investigations at the source, and (2) utilization of Vickers' test facilities.

C. Initiate any necessary corrective action or changes required to improve the reliability level of the product through the Director of Quality Monitoring.

D. Periodically compile the measure of achieved reliability (from the available field data).

DIVISIONAL RELIABILITY MONITORING

As the correlating and monitoring agency, the Analysis Group, under the Director of Quality Monitoring, is responsible for:

1. Monitoring and approval of any Vickers documents pertaining to quality and reliability.

2. Monitoring adherence of all departments to existing controls. Participate in the establishment of control points.

3. Continual review of the existing controls to keep them dynamic.

4. Periodic review of correlated data.

5. Initiating action to determine the cause of significant trends or evidence of recurrent deficiencies.

6. Over-all presentation of reliability assurance progress.

7. Training and operating personnel in the science of:

A. Interpretation of reliability requirements.

B. Statistical design of experiments.

C. Logical deduction from data.

D. Statistical decisions.

four phases is contained in an accompanying chart "A."

Vendor Surveys

The development of adequate vendor relations was discussed in detail by William A. MacCrehan, Jr., of the Avionics Division of The Bendix Corporation, Baltimore, Md. He said, in part, that satisfying ourselves that the product design will perform its intended task is step number one . . . we then must assure ourselves that the vendor has control over his manufacturing process. To accomplish this objective, we like a vendor survey. Nothing takes the place of a first hand visitation to a vendor's plant for the purpose of mutually understanding the end objective—a reliable product. While on the visitations, such items as how the part will be processed, what tooling is involved, what degree of Quality Control will be established at the vendor's Receiving Inspection, in-line assemblies and final inspection, what product assurance tests will be run by the vendor e.g. life tests, environmental tests, mean time to failure tests, etc.

Who Pays the Cost?

During these visits, the question often is raised—"who pays for this Reliability Assurance?" The answer is we both pay for this assurance . . . the purchaser as his share for obtaining "customer insurance" that the product will deliver good service life and the supplier pays as his competitive share of doing business where the end product must have a proven reliability . . . to be more specific, a precision resistor manufactured by a company in the resistor business, today must carry with it the assurance of long life, holding tolerances under varying temperature conditions, to hold its precision without deterioration due to aging. To be competitive in the field, this manufacturer must *build in* to his product planning specific tests to control his product so that it meets competitive specifications. Should the manufacturer elect not to provide this assurance, their unreliable products in the field quickly leads to loss of business. For our part, we do not desire to be the customer of a vendor producing an unreliable product, thus we expect the vendor to have a reasonable self generation to provide assurance of producing a reliable product.

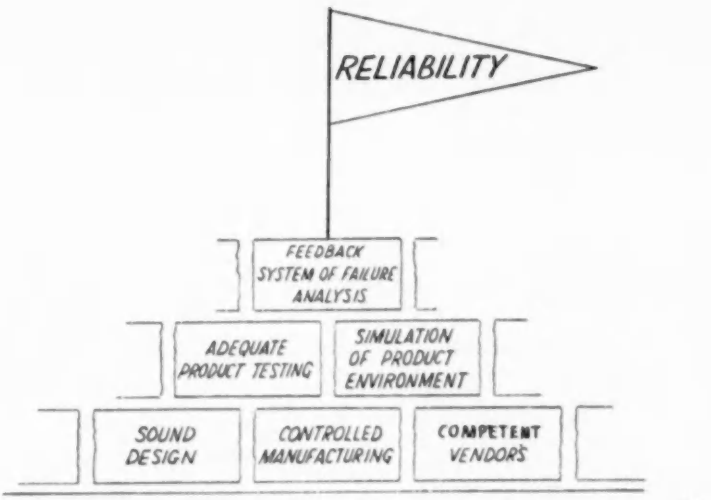


Chart presented by Wm. A. Mac Crehan, Jr., of the Avionics Division of the Bendix Corp.

When the agreements have been worked out with the vendor on assurance of control over the manufactured product, we then establish an audit of these controls in our Receiving Inspection. A percentage of parts receive the usual A.Q.L. screening and a percentage of parts receive qualification tests. When the first samples of the lot passes qualification tests, the entire lot is released for production. These are coded in one way or another. Sheet metal parts are dipped in a color dye, other parts are color-coded with a dot of paint, still others bear date codes, lot codes, etc. The purpose of this identification is for data feedback. Our experience is that unless you know from what lot, batch, shipment, or bulk pack the defect is occurring, you cannot isolate to prevent further failures . . . oft times a great deal of respect can be generated when you can go to a customer and say "we had some trouble, we know where the trouble is located, we have a fix, and we know which units to apply the fix."

To further assure a control, we attach a prestamped, self-addressed postal card to each finished unit. This postal card is addressed to the Manager . . . this gives the customer a first hand opportunity to place his complaint with the top official. Where these complaints involve a vendor's product, the postcards add factual collaboration to our complaint investigation.

Four-Fold Approach

Our approach to Vendor Reliability is four fold:

1. Select capable vendors who understand their obligation to produce a reliable product.

2. Assist through plant visitations, vendors customer conferences, and coordinating letters to arrive at a mutual understanding of the objectives and yardsticks to measure vendor conformance.

3. Keep a detailed record of use of the vendor's part in the final product through—(a) vendor rating, (b) field information and (c) reliability evaluation.

4. Recognize that both the vendor and we, the purchaser, have a mutual obligation to the end user—*the customer*—which

(*Turn to page* 66, *please*)

New Mechanical Plating Process

USING the mechanical plating process recently announced by Minnesota Mining and Manufacturing Co., Mellowes Co., Milwaukee, is turning out zinc-coated lock washers for the automotive industry for which several advantages are claimed. Most important is that, because there is no electroplating with its liberation of nascent hydrogen, there is no hydrogen embrittlement.

In the case of lock washers, the problem of hydrogen embrittlement is accentuated by the fact that the parts are made of SAE 1060 to 1065 steel, heat treated to Rc 45 to 53 hardness. This produces a washer that will offer strong resistance to compression, but will snap if slight embrittlement is present.

The mechanical plating system as used at Mellowes Co.—known as "Dyko" brand metal plating, Minnesota Mining and Mfg. Co.'s trade name—takes the steel washers after heat treatment and starts them through the series of treatments. The first bath is an alkaline cleaning solution, followed by a water rinse. The pieces then go into a Bonderite dip, which completes the cleaning process. After a water rinse, the batch is then given a treatment in a copper sulphate solution, resulting in a deposit of copper over the steel surfaces. This is a necessary base for the zinc coating. A water rinse also follows this chemical dip. This pre-treatment is subject to changes and variations to suit the service requirements of the parts being plated.

For development of the zinc coating, the parts are dumped into a rubber-lined tumbling barrel. A weighed amount of zinc metal powder is added to the charge, the amount depending upon the thickness of metal coating desired, and upon the type of washer to be plated. In the Mellowes' installation, this may be about four pounds. The impact media, which are glass beads of several sizes and of spherical and non-spherical form, are then added in weighed amount. These glass particles are made up in approximately a 4-2-1 ratio of smallest-size spherical particles, medium-size non-spherical particles, and largest-size spherical particles. The promoter chemical supplied by Minnesota Mining is then added, with enough ordinary tap water to cover the charge. It is this chemical which causes the metal powder to migrate to the surfaces of the parts to be coated.

The barrel is closed and rotated for about 45 minutes, the exact time depending upon the nature of the parts to be coated. During this operation the zinc powder is transferred to the surfaces of the workpieces by the action of the chemical, and impacted onto them by the glass beads.

The bond, Mellowes reports, is fully as strong as that produced by electro-plating. It has never been a problem. No electricity is used, and there are no fumes nor mist arising from the tumbling barrel.

At the end of the tumbling period, the barrel is emptied, water and spent chemicals being flushed away, and the solid contents are then run over a magnetic separator. This removes the washers from the mass; and the glass beads can be washed and returned to the tumbling barrel for the next plating batch.

The washers for most applications are given a chromate treatment, which considerably increases the corrosion-resistance of the pieces as measured in the salt spray test. After being subjected to the chromate solution, the washers are dried in a small gas-fired dryer. These post-plating operations are built into the unit so that they occur in zones of a small perforated revolving drum and a small warm-air drying tunnel, the latter only about six feet long. This completes the process. The plated washers are discharged into shipping cartons.

The zinc plating as produced by the Mellowes Co. is 0.0003 in. thick, in contrast with the standard 0.00015 in. to 0.0002 in. by electro-plating. While the process has been in commercial use at the company

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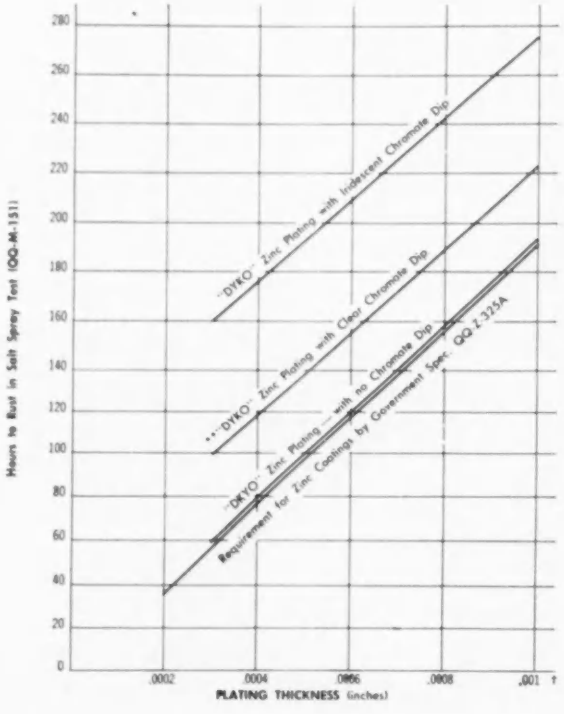
Salt Spray Test Performance for Mellowes Lock Washers with Dyko Zinc Plating



Convenience of assembly of Ford tractor engines was the reason for conversion of the engine assembly line to a merry-go-round conveyor with 58 pedestals to hold the engines. All tractor engines, including 4-cylinder in two sizes, and 6-cylinder, are built up on this line. Diesel, gasoline and LP-gas engines are intermingled.

FORD TRACTOR

More than 230 items of new equipment were added in multi-million dollar modernization program

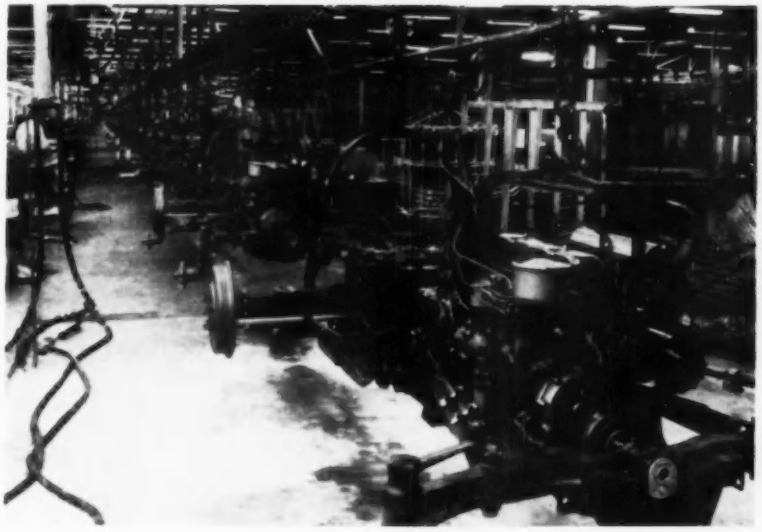
INCIDENT to the launching of the Ford "6000" diesel tractor, announced a few months ago, Ford Motor Company completed a multi-million dollar modernization and expansion program at its Highland Park (Mich.) tractor plant. In the process some 290,000-sq ft of additional floor space was utilized, and 230 items of new equipment were added.

The engine assembly system was completely changed to make it possible to handle four-cylinder gasoline and diesel engines; the new 6-cylinder gasoline and diesel engines; as well as an LPG version of the Six later on. To this end, the engine assembly line now consists of a merry-go-round conveyor, fitted with 58 stations on nine-foot centers, for a developed length of 522-ft. Engines are built up on special pedestals designed to hold the engine in several convenient positions, starting with a cylinder block mounted in vertical position.

Final Assembly

The final assembly line too was rebuilt to increase carrying capacity for accommodating the "6000"

Assembled engines are transferred from the merry-go-round floor conveyor to an overhead conveyor which takes them to the "hot-test" area where each engine receives a 20-minute run-in.



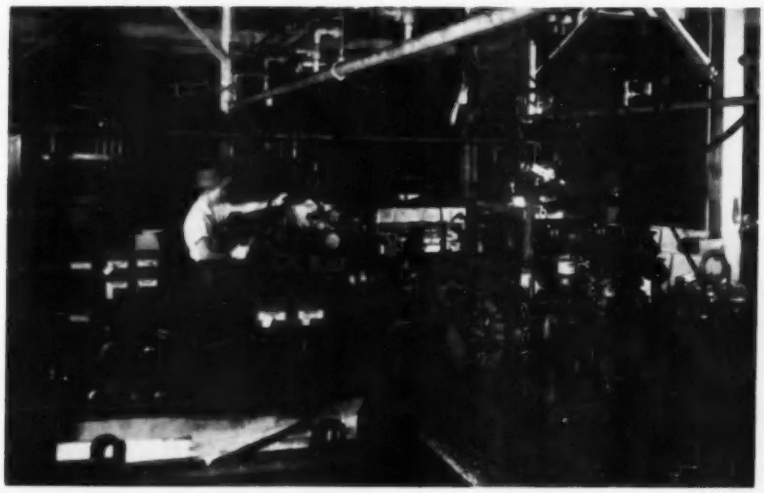
Final assembly of all Ford tractors takes place on a line 3400-feet long. More than 80,000 tractor combinations can be produced here. An industrial tractor is in foreground, followed by a four-wheel agricultural unit. The new "6000" agricultural tractor, Ford's largest and most-powerful tractor, is third down the line.

PLANT MODERNIZED

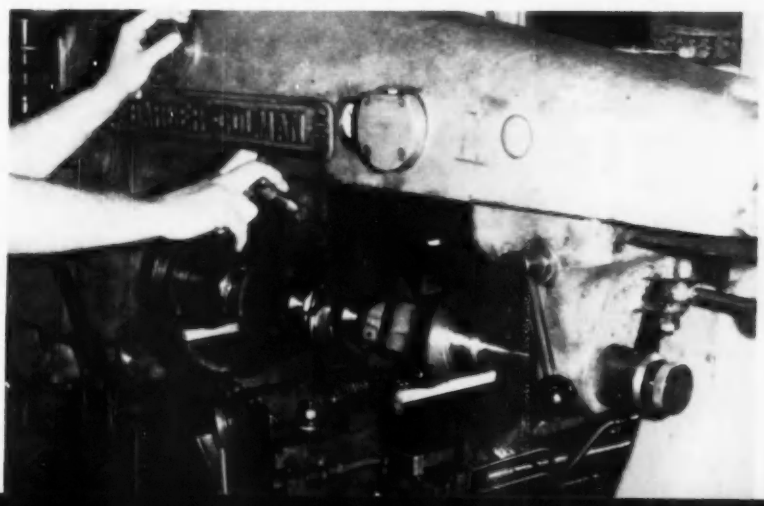
tractor which weighs over 6500-lb. In addition, the length of the assembly conveyor was increased to 3400 feet by adding 400 feet. This made it possible to introduce additional sub-assembly lines. Most noteworthy of these is the conveyor that feeds engines and transmissions to the final line. Here each engine is placed on the conveyor side by side with the specified transmission. Thus they are fastened together only when they are installed in the chassis.

Transmissions are assembled and tested in a sealed and air-conditioned enclosure. At present there

(*Turn to page* 66, *please*)



Engines alternate with transmissions on this feeder conveyor which is perpendicular to the main assembly line. On the latter line, the transmission and engine are joined to the center housing which contains the differential and rear axles.



Crankshafts for the 4-cylinder diesel engine have an integral gear to drive the Lanchester balancer. This gear is hobbed on a Barber-Coleman machine as shown, and finished on a Michigan Tool gear shaver in an adjacent operation.

Machine Tool Builders Report Little Change in Business Picture

By Charles A. Weinert
EASTERN EDITOR

Latest AI SURVEY Indicates—

- **Slightly-Greater Order Backlogs**
- **Business the Same in 2nd Half**
- **Additional Price Rises Under Way**

WITH January 1 as a "starting point," machine tool builders at the close of 1st Half '61 reported an essentially unchanged trend in the industry's business situation.

While order backlogs appear to be slightly higher, there is no indication of a general upswing—nor is one anticipated in 2nd Half '61. At least, the industry seems to be "holding its own" at the incoming new business rates of the past year or more—and the outlook is not inclined downward. And, with this situation and the present economic climate, there is always a chance of a change upward in quick order.

Price increases on machine tools, notwithstanding the industry's present below-capacity business, are becoming more prevalent and should be taken into account by the purchaser. They reflect added production costs incurred by the builders. As some have expressed it, the price rises are "overdue."

Also, in planning acquisitions of machine tools, deliveries of equipment from specific builders should be checked in advance. More time will be needed in some cases.

As heretofore when presenting these quarterly reports, we must point out that the above impressions are overall industry ones. They were arrived at by averaging-out the responses to our latest periodic survey questionnaire. They do not necessarily apply to any one builder.

In some instances, the variation from company to company is quite marked. As a matter of fact, we have noticed that the situations of individual companies sometimes change substantially (up, as well as down) from time to time.

So the thing to keep in mind here is that we have been talking in terms of the "machine tool industry."

Further details about the current survey are contained in the following. As will be made evident, the information was compiled from 31 special reports to AUTOMOTIVE INDUSTRIES cooperatively supplied by leading machine tool executives. (For reference to prior similar reports, see AI issues of February 1 and May 1, 1961.)

ORDER BACKLOGS

In the questionnaire, the machine tool builders were asked to indicate how their unfilled orders on hand July 1 compared to the volume at January 1, 1961.

Order backlogs of "about the same" proportions were reported by 9 (of the 31) companies.

Higher backlogs—ranging from 5 to the unusually-high figure of 400 per cent—were reported by 12 companies. One company in this group showed an overall rise of 190 per cent—made up of 40 per cent domestic and 150 per cent foreign. Another company, with an increased backlog of 50 per cent, stated, "Automotive and European orders previously pending have come through."

For the group as a whole (12 companies), the average is +75.3 per cent. If weighted, however, to exclude the effect of the two big performers (190 and 400 per cent), the group average for the remaining 10 is +31.4 per cent.

Lower backlogs—with a range from as little as 2 to as high as 52 per cent—were listed by 10 companies. The average for this group is −19.7 per cent.

For all of the 31 companies, the combined average is +22.8 per cent. However, if weighted once again to exclude the two "unusual highs," the average becomes +4 per cent.

This latter figure, incidentally, does indicate another slight rise in order backlogs since April 1. The results of our survey then showed a +1.8 per cent order backlog increase at the close of the 1st Quarter '61 versus January 1.

AUTOMOTIVE ORDERS

The builders were queried, "Percentagewise, how much of your total orders on hand as of July 1 is represented by orders from automotive companies?"

As in the prior surveys, the big majority (26 companies) report automotive orders on hand. The automotive portions range from "a few" to as much as 88 per cent. Other "highs" in addition to the 88 per cent, are two 60, one 75, and one 80 per cents.

One of the builders, with a 35 per cent automotive order portion, commented that about three-quarters of his present unfilled orders

are from foreign sources. Another builder, with an automotive order size of "over" 40 per cent, said this included foreign orders, and that domestic automotive orders represented 11 per cent. Still another, with 15.5 per cent, showed foreign 9 per cent and domestic 6.5 per cent.

In any case, the group average is 36.2 per cent automotive among orders on hand as of July 1, for the 25 companies giving numerical percentages.

Five companies (of the 31) said they had no automotive orders on hand as of July 1.

INQUIRY ACTIVITY

As with order backlogs, the relationship of inquiry activity at July 1 with that at January 1, 1961, was requested.

Inquiry activity at the "same" level was reported by 13 companies. More activity—with a range from 5 to as much as 380 per cent—was listed by 10 companies. The company "busy on inquiries" (domestic 100 per cent, and foreign 280 per cent) is the one who reported a rise of 190 per cent in order backlog. The company which showed a rise of 400 per cent in order backlog, also reports an "up" of 100 per cent in inquiry activity.

The average for the group of 10 companies reporting more inquiry activity is +65 per cent. Weighted to exclude the 100 and 380 per cents, it is +21 per cent average for 8 companies.

Less activity—from "slightly" to 75 per cent—was the report of 8 companies. The group average for the 6 companies giving figures is −36 per cent. If weighted to exclude the one 75 per cent "down," the average for the remaining 5 companies is −28 per cent.

For the 29 companies which gave numerical percentages on inquiry activity July 1 versus January 1, the average is +15 per cent. Weighted to exclude the two large "ups" and the one large "down," the group average for the remaining 26 companies is +1.1 per cent.

Our comparable figure at the end of the 1st Quarter was +3.2 per cent.

BUSINESS OUTLOOK

Questioning as to the outlook for order receipts in the 2nd Half '61 versus the 1st Half results, initiated this response:

The "same" volume was predicted by officials of 14 companies. One of these, however, stated, "Our business has been good." Another said it is the "Best we can hope for."

An increase in incoming orders was forecast for 8 companies. Numerically, the increase ranges in individual cases from 10 to 100 per cent. One of the spokesmen just predicted an "up." The 100 per cent increase in business was listed by the company whose order backlog was up 400 per cent and whose inquiry activity was up 100 per cent. One comment (10 per cent increase), "Should get results from some who may have been holding back waiting for trend."

For the group of 7 companies giving figures, the average is +31.4 per cent more business in the 2nd Half. If the 100 per cent company is deleted, the average for six companies becomes +20 per cent.

Decreased business in the 2nd Half was predicted by 8 executives, with a range from 10 to 40 per cent. One, with a 30 per cent downward prediction, stated, "This is due to the long deliveries we are quoting." The group average for the 8 companies is −23.7 per cent. If the highest one (40 per cent) is deducted, the average for 7 companies is −21.4 per cent.

One of the respondents commented he had "no idea" of the outlook.

For the overall group of 29 companies which gave figures, the average is +1 per cent. If the "up" of 100 per cent and the "down" of 40 per cent are discounted, then the average for 27 companies works out to be −1 per cent. Therefore, the reports of this group of 27, or 29, companies would indicate that new business volume in the 2nd Half, versus the 1st Half, is expected to be just about equal in size.

AUTOMOTIVE PROSPECTS

Inquiry as to whether any sizable automotive business was in sight resulted in the following answers.

Six said "yes," and 25 said "no." One of the affirmative replies qualified it with the statement, "Foreign, yes; domestic, approximately the same as 1st Half." One of the negative replies stated, "It has already been placed." Another "no" said, "Unpredictable, note increase (60 versus 25 per cent automotive orders on hand) since last time due to several large orders."

EQUIPMENT DELIVERIES

For future-planning purposes, those addressed were again asked, "Do you anticipate the delivery time on orders placed during the 2nd Half '61 will run longer than that quoted during the 1st Half '61?"

In the present survey, 17 companies foresaw the same delivery rate.

Longer machine tool deliveries are expected in the case of 9 companies. Most of the extensions are on the order of 2, 3 or 4 weeks. However, one gave 8 weeks, another 12 weeks, and another as much as 26 weeks.

Shorter deliveries are foreseen by 5 companies—mostly to the extent of 4 weeks, although one said 8 weeks less delivery time.

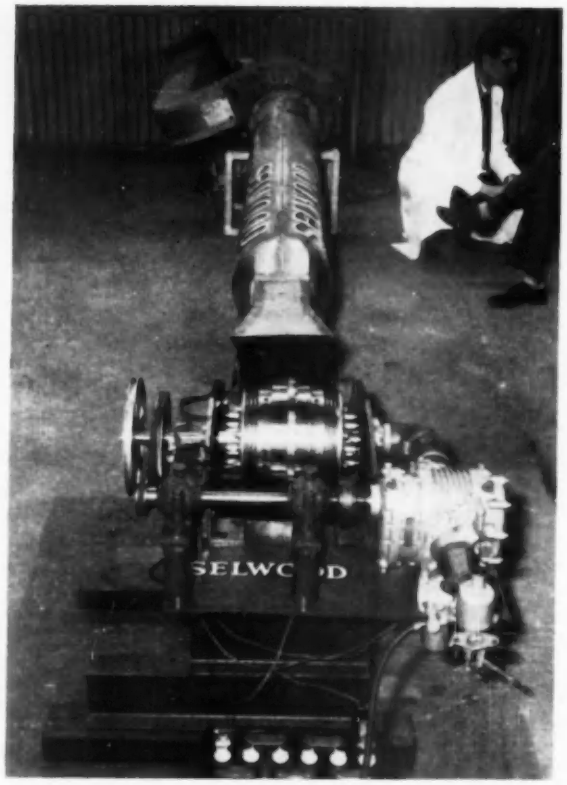
PRICES OF MACHINES

It will be recalled that in the last two surveys (reports covering which appeared in AI for February 1 and May 1, 1961) we inquired, "Do you expect to increase in the near future the prices of your machine tools; and if so, what is the percentage increase and when will it become effective?" This question was repeated in the present instance.

The replies this time saying "no change" total 22. However, it will be seen in the May 1 report that 28 different companies had advised us of price rises in effect or in contemplation during the then prior

(*Turn to page* 68, *please*)

Rotary Cylinder Engine Has Non-Reciprocating Pistons



Engine on its demonstration test bed. S.U. carburetor is mounted on the belt - driven blower used for scavenging. Exhaust extractor is behind.

By David Scott
BRITISH CORRESPONDENT

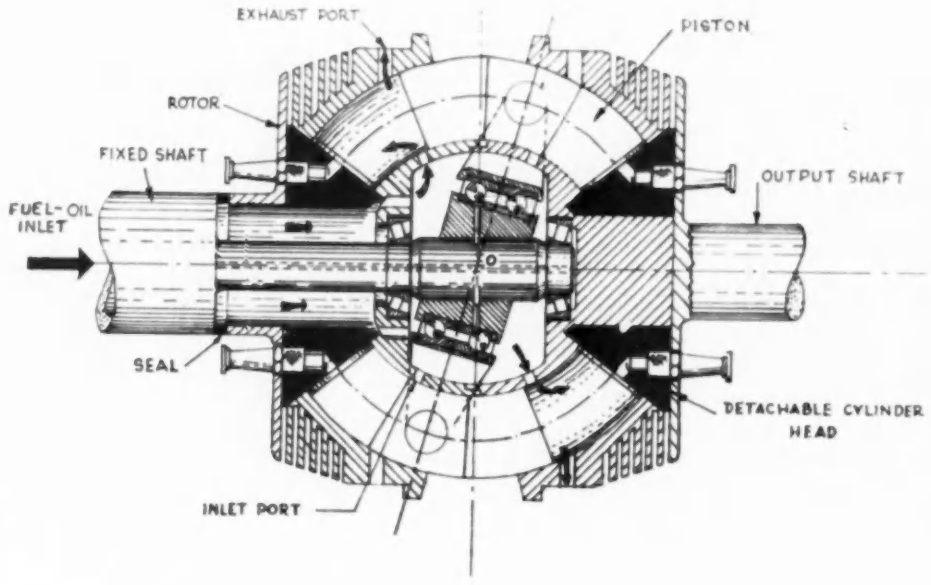
AN unusual rotary cylinder engine has been produced in England by William R. Selwood Ltd., Chandler's Ford, Southampton, that is claimed to combine the thermodynamic efficiency of a conventional piston engine with the low stresses and friction losses of a gas turbine.

Designed by Cecil Hughes, the experimental model of 700-cc (43-cu in.) displacement consists of a 10½-in.-diameter drum-like block weighing about 60 lb. Output has not been disclosed, but power-to-weight ratio is claimed to be higher than anything in existence.

It has 12 axial curved cylinders, and the block is in two sections comprising opposed sets of six cylinders. There are six double-ended curved pistons joined by a central spider, whose six arms pass between the pistons and are linked to them by crossbars with a ball joint in the midpoint of each pair.

The hub of the spider is on a ball bearing, with the inner race carried on a bushing whose bore is inclined 15 deg. Cylinder block and spider are on a common shaft and rotate together as a unit, but the cylinders move in a simple circle while the pistons follow an orbital path.

The pistons slide to and fro in the opposed cylinders because of



Sectional view of the engine. Web formed by arced ribs between the spider arms aligns and joins the two cylinder blocks. Central chamber is normally enclosed by flanged clamps.

the displacement of the two planes of rotation. Reciprocation of the pistons in the cylinders is only relative, not actual. There are no connecting rods, crankshaft or conventional flywheel.

In operation, the gas explosion in a cylinder tends to force the piston forward. But since the piston can only move forward by going sideways at the same time, the power impulse drives it into its natural orbital path, which imparts a rotary motion to the cylinder block.

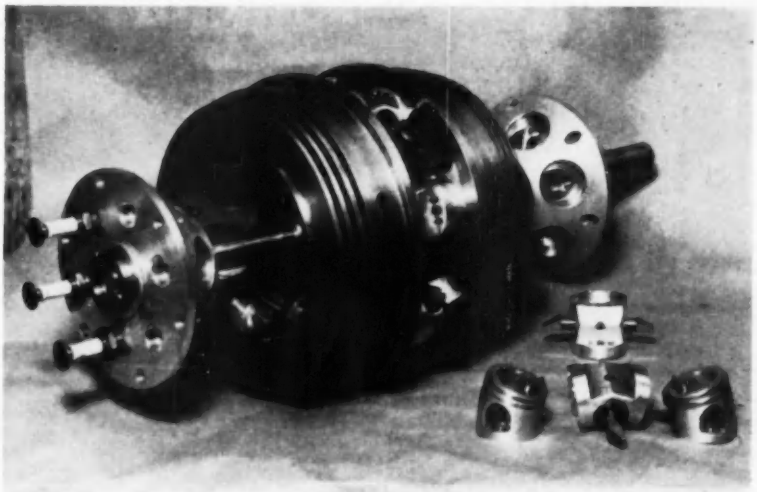
The engine runs on a two-stroke cycle, and gas from the carburetor is pumped by a Roots-type blower through one end to the central chamber between the two cylinder banks. The inlet pipe is coaxial with, and surrounds, the fixed bearer shaft, and the joint with the rotating block is made gas-tight by a teflon-and-rubber seal.

Vaporized fuel, under pressure in the chamber, is released into the cylinders when their retracting pistons uncover the inlet ports. A blower is needed to fill the cylinders because the scavenging pressure in a normal two-stroke, built up in the crankcase by the undersides of the pistons, does not exist in this double-acting engine.

Fuel is a 16 to 1 gas-oil mix, and the vapor fills the chamber to lubricate all the bearings and surfaces. An annular cover formed by two flange clamps bolted together seals the gap between the cylinder blocks. At the end of each power stroke the exhaust ports in the outer cylinder walls are exposed, and burnt gas is blown and centrifuged out.

The engine is its own distributor. Six spark plugs are screwed into the end face of each conical cylinder head, and their broad, flat terminals circulate past the stationary electrodes with 0.030-in. clearance.

Electrodes are diagonally opposite each other, so diametrically-opposed cylinders are fired simultaneously. This cancels out end thrust on the main bearings and thereby reduces friction, and eliminates vibration except for a negligible angular thrust. There are 12 power impulses per revolution.



Engine with cover removed and conical cylinder heads withdrawn. Curved double-ended pistons are made in three parts, and use standard square-section rings.

Partially-stripped engine reveals the skewed hexagonal ring formed by piston crossbars clamped in the ends of the spider arms. Triple holes are exhaust ports. One of the stationary ignition electrodes is at the right.

Two coils supply the high voltage, and primary circuits are interrupted by a contact breaker, with two sets of points, that is geared to the output shaft. Air-cooling of the ribbed cylinder block is by forced convection from the surface of the rotating mass.

The designer claims that the engine has a third the frictional losses of the usual gasoline unit. As it is inherently balanced and purely rotary, and has no reciprocating parts, stresses and wear are very small. Pistons are locked to the spider, so centrifugal force does not aggravate cylinder wear.

The experimental engine, it is stated, is in rudimentary form, yet during the past year it has run over 300 hours at speeds up to 4000 rpm without needing replacement of a single part.

Further development now is in progress. Compression ratio of the present unit is only 3 to 1, purposely fixed at this low figure as there are plans for a high-pressure supercharger to improve breathing and efficiency. This might be a rotary compressor incorporated in one cylinder head around the inlet pipe. A combined starter-generator, like those in the flywheel of some motorcycle engines, also could be fitted. Exhaust will be ducted away in an annular manifold covering the external port area. ■

Lucas Introduces Electronic Ignition System

Submerged Fuel Pump and Electric Cooling Fan Also Brought Out by the British Manufacturer

By David Scott
BRITISH CORRESPONDENT

JOSEPH LUCAS of Birmingham, England, has released details of a patented ignition system in which the high tension voltage is produced entirely by means of an electronic circuit. It is intended for multi-cylinder high-speed engines running at 8-12,000 rpm, and is capable of producing 1000 sparks per second.

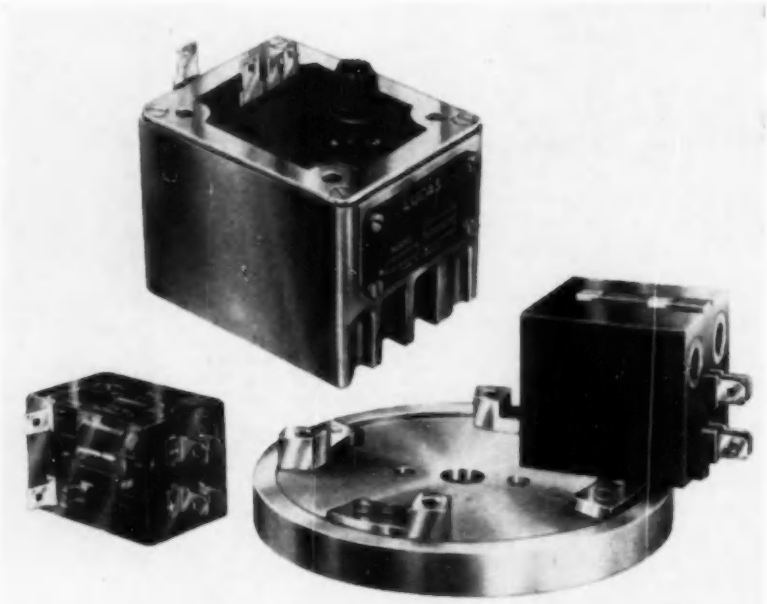
Other advantages claimed are improved timing accuracy by eliminating the backlash, torsional oscillation and mechanical wear in the usual distributor drive and contact breakers, and a constant voltage over the entire speed range.

The system comprises an electromagnetic pickup associated with pole pieces on the engine flywheel, a trigger amplifier, a spark generator and a high tension distributor. A voltage impulse is produced at the pickup each time one of the pole pieces passes within its field, and this is fed to the amplifier which acts as a normally-closed switch allowing current to flow through the primary winding of the trigger transformer. The pulse effectively opens this switch, so that current flow through the primary ceases.

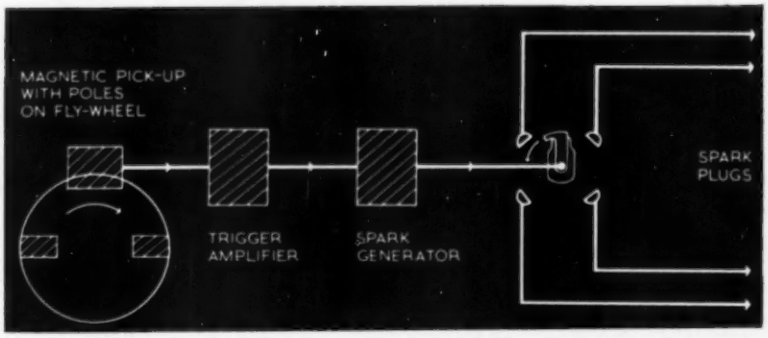
Energy released by the resulting collapse of current induces a voltage in the transformer secondary which, in turn, causes a current to flow in the base circuit of the spark generator. An associated transistor becomes conductive, allowing current to flow in the primary winding of the high-voltage transformer.

A regenerative oscillation is set up, resulting in a very rapid increase in primary current, which induces a voltage of over 20 KV in the secondary. This is fed to a rotor for distribution to the spark plugs. Regeneration ceases when the transformer is saturated, and the transistor again becomes non-conducting. Regeneration cycle time is under 200 microseconds.

With the cessation of the voltage pulse at the pickup, conduction starts again in the trigger amplifier in readiness for the cycle to



Components of the Lucas electronic ignition system for an 8-cyl engine with fixed ignition timing.



Simplified schematic layout of Lucas electronic ignition system for a 4-cyl engine

be repeated at the next pickup impulse.

Lucas emphasizes that the new system still is under development to meet possible needs of advanced racing engine designs, and regards existing ignition equipment as perfectly adequate for normal production vehicles.

The new Jaguar Grand Touring Type "E," unveiled at the Geneva Motor Show, incorporates three further Lucas developments. One is an electric fuel pump submerged in the fuel tank, which minimizes the possibility of vapor lock since no vacuum can occur on the intake side of the gravity-fed pump.

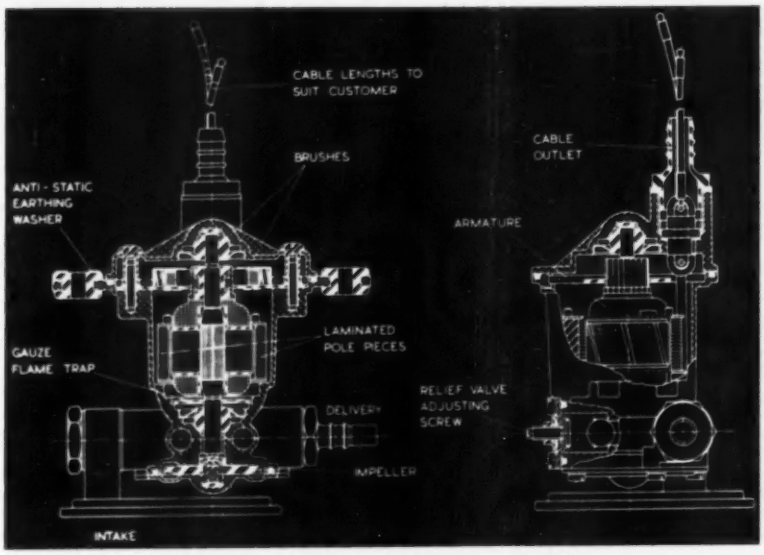
The unit consists of a permanent-magnet field motor and a cumulative-type centrifugal pump with intake and delivery ports at the periphery of the impeller. The die-cast casing is fully sealed, and the entire interior, including commutator and brushgear, is flooded with gasoline to eliminate the risk of ignition.

Fuel sucked up through the pancake intake screen passes through the lower armature bearing, into the motor chamber, and then through a return passage to the intake port. Repriming of the pump after the tank runs dry is expedited by a small bleed hole in the casing near the outlet port.

Safeguards against gas ignition when the pump is operated in an empty tank are the non-combustible richness of the vapor trapped in the casing, and the small clearances of the only communicating passages between the motor and pump (the lower bearing and circulation return passage) which serve as flame traps. A gauze flame trap is placed between the armature and lower bearing to cover the possibility of a bearing developing excessive clearance.

Another innovation is an electric cooling fan replacing the usual belt-driven unit. The 12-volt unit draws 6-7 amps, and is automatically controlled by a water thermostat. Main advantages are stated to be quicker engine warm-up from cold, noise reduction, and increased power available at high speeds.

The Jaguar also features a Lucas three-bladed windshield wiper for effective coverage of the ends of the large wrap-around glass. ■



Arrangement of Lucas fuel pump—model 2fp

A typical Lucas model 2fp fuel pump

The Lucas electric motor driven radiator cooling fan model 3gm

P. O. Truck Order

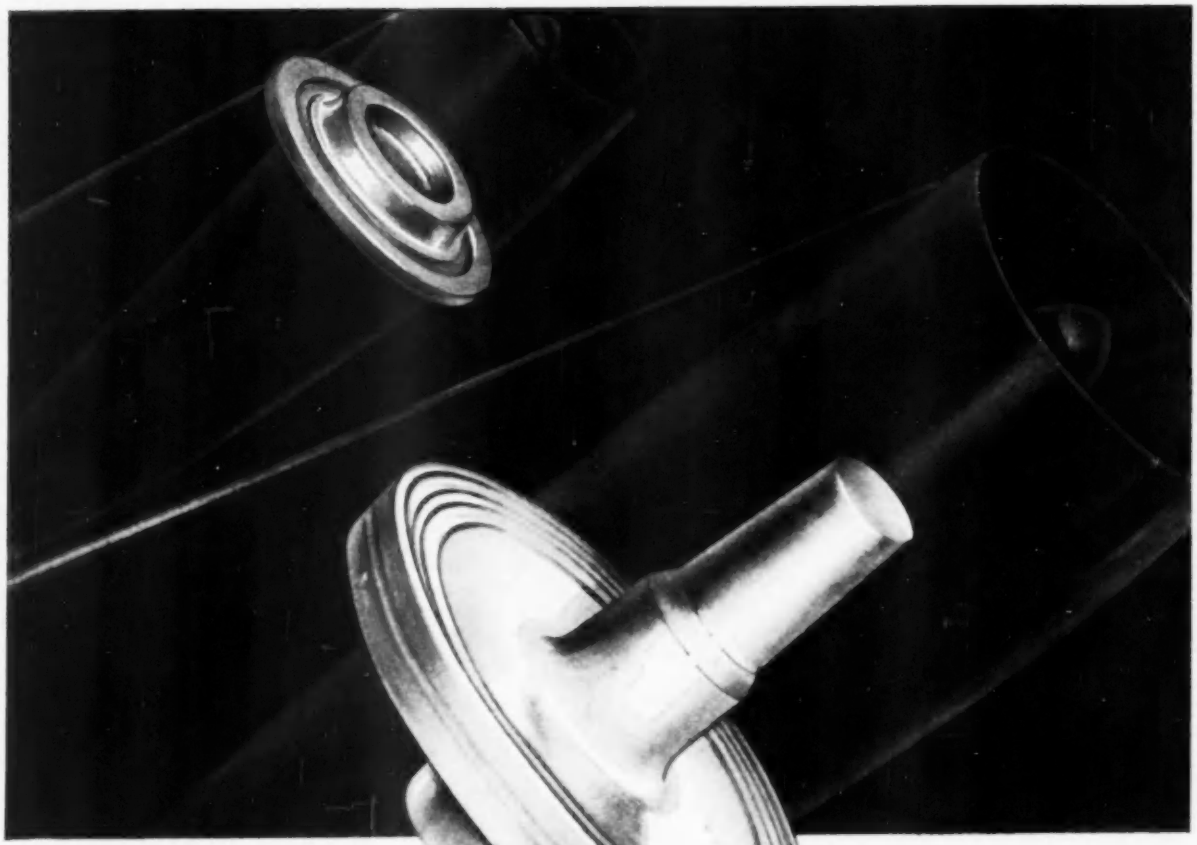
A contract for 1751 trucks for the Post Office Department was awarded to Chrysler Corp. by the General Services Administration. The contract amounted to $3.9 million.

The trucks are of the walk-in, forward control type, and will be powered by "slant six" engines. They will be equipped with automatic transmissions and plastic skylights in the roof panels.

The vehicles will be built in the Dodge Truck Plant in Warren, Mich. Production will begin Oct. 1.

Industrial Fasteners

May shipments of industrial fasteners were 86 per cent of the 1956-58 average. This substantial upturn, 11 per cent above the first quarter average, is the first increase since December, 1959.



Diameter 29". Weight 1000 lbs.
Material Astroloy

Diameter 24½"
Weight 191 lbs.
Material Titanium

Diameter 19"
Weight 143 lbs.
Material High strength steel

Length 22"
Weight 45 lbs.
Material High strength nickel base alloy

Length 18"
Weight 10 lbs.
Material Ironbase high-temperature alloy

Diameter 10"
Weight 45 lbs.
Material Inconel X

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GR5

Circle 120 on Inquiry Card for more data

News of the MACHINERY INDUSTRIES

The Defense Department is Overhauling its Machine Tool Purchasing Practices as a Result of Criticism from Government Auditors on the Management of Idle Machine Tools

By Charles A. Weinert

Defense Department Views M-T Buying Practices

The Defense Department is taking a careful look at its machine tool purchasing practices. It portends less machine tool buying—but substantial savings to the Government by eliminating unnecessary new purchases. It may also result in the setting up of a single manager for all tool buying—Army, Navy, and Air Force.

New policies were initiated after Government auditors recently testified that poor handling of idle machine tools was costly. U. S. Comptroller General Joseph Campbell reported to Congress that a sampling of one procurement revealed that new tools costing $700,000 were bought when identical or usable idle equipment was available. The machines involved apparently were metal-cutting types—drilling, boring, grinding, and milling.

Government auditors also remarked that $63 million was spent for new tools in the fiscal year ending in June, "despite" a reserve of 140,000 military machine tools.

Thomas D. Morris, Assistant Secretary of Defense for installations and logistics, stated he believed the instances of unnecessary procurement were within reasonable limits. He admitted, however, that the procurement in question was "unnecessary."

Assistant Secretary Morris has ordered a study of Defense Department production - equipment procurement, with special consideration to placing it under one manager. The auditors feel that a single tool-buying manager for the Army, Navy, and Air Force would end unnecessary purchases.

Meanwhile, Morris said, immediate procedural improvements will be placed into effect.

Cincinnati Milling Builds Grinding-Hardening Line

Cincinnati Milling's Grinding Machine Div. recently completed a continuous-flow grinding line which includes a hardening setup. The latter automatically hardens the parts as they move from the first to the second centerless grinder in the line. The workpieces are shock absorber piston rods.

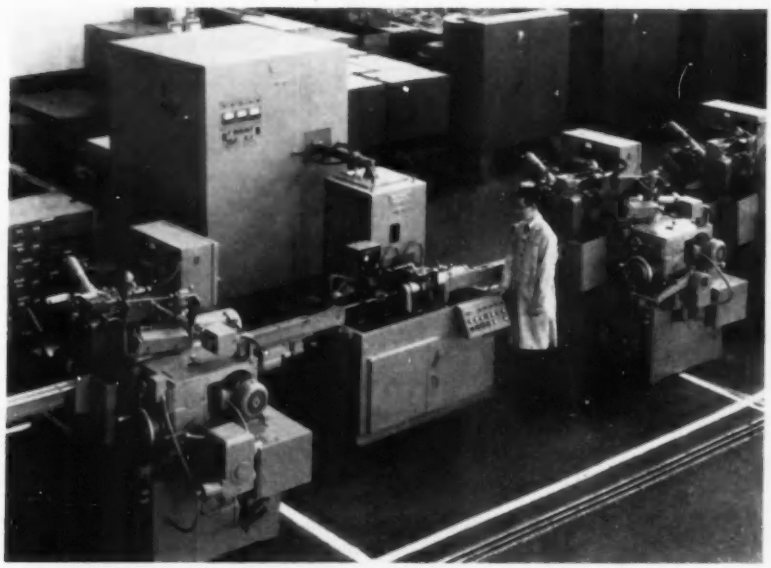
A hopper feeds the parts into the first centerless machine for initial grinding, where about 0.006 in. of stock is removed.

The hardening unit, next in the line, is a 50-kw Inductron radio-frequency induction - heating machine. At the work station of this machine the feeding device rotates the workpieces while continuing their forward movement. As each shock absorber rod reaches a predetermined point, a presence-sensing device sends a signal to energize the induction coil through which the part passes, producing a brief, timed heating cycle for each part. Since the ends of the rods must remain unhardened, the heat is selectively applied to the center section only.

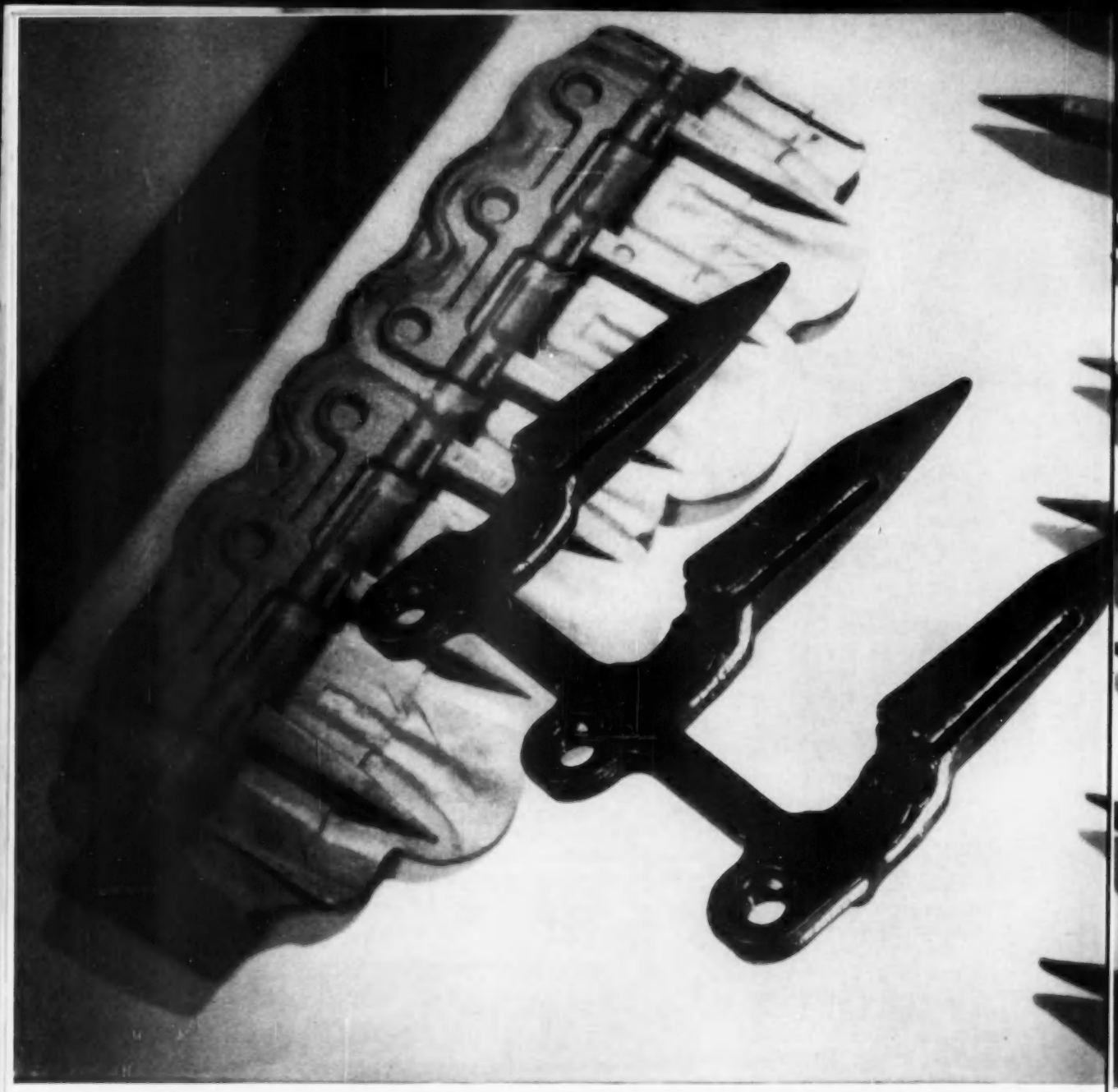
After heating, the rods continue through an adjacent quench ring. The result is said to be a uniform 50 R_c case, 0.020 in. deep.

The workpieces then are automatically conveyed to four in-line Cincinnati No. 2 centerless grinders for finish-grinding. Stock removed by these four machines is 0.004, 0.002, 0.001, and 0.0005 in., respectively.

The shock absorber piston rods pass through the production line at the rate of 12 ft per minute, equivalent to 960 parts per hour. ■



This production line, built by Cincinnati Mill, induction-hardens, as well as grinds, shock absorber piston rods at the rate of 960 parts per hour



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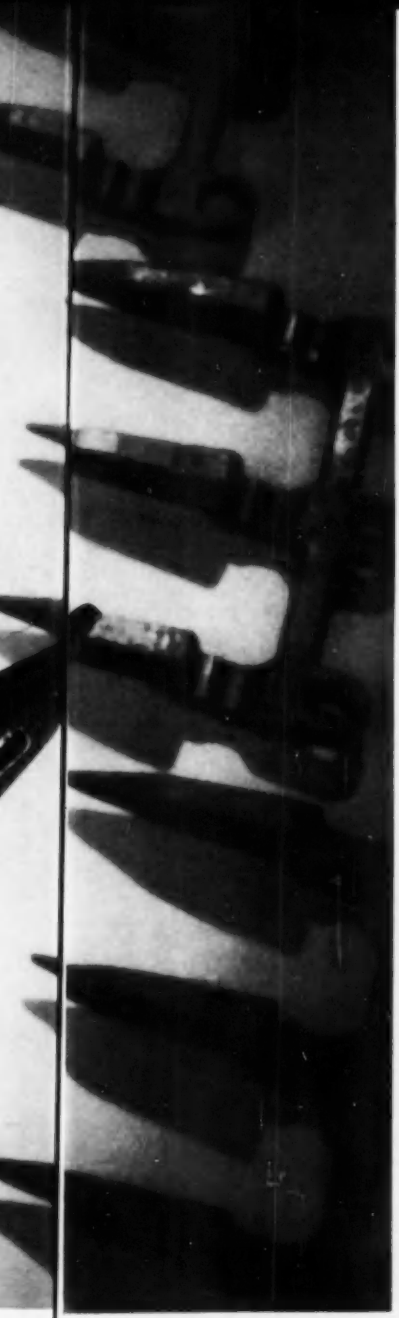

Sickle guard forged from USS Bar Stock for longer life

This forged and machined part will last longer than the cast design it replaced even though it weighs 12% less and costs less. It's a sickle guard used on the cutting platform of a line of John Deere self-propelled combines, and is manufactured by Buchanan Steel Products Corporation, Buchanan, Michigan.

John Deere wanted the part to be thinner for maximum cutting coverage at high speeds, and shock- and wear-resistant so that it could self-sharpen the blade. The designers specified forged steel because it would mean a lighter, tougher, more durable part. The part is forged from bar flat steel produced by United States Steel.

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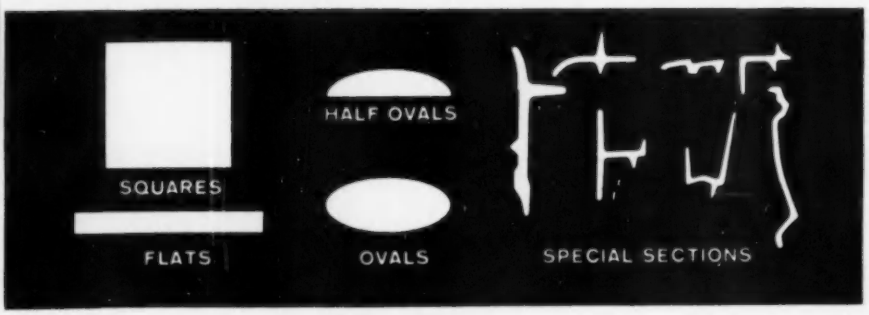

USS United States Steel

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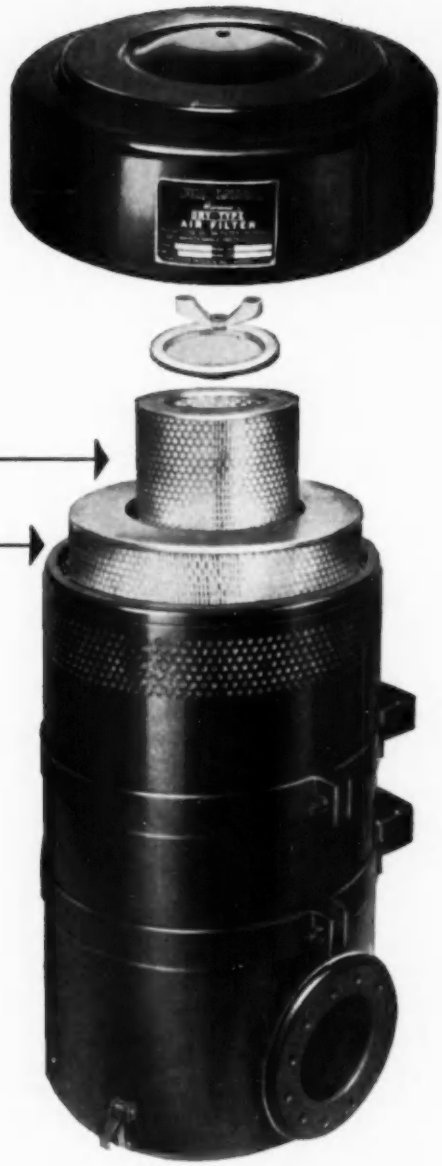

an element here

and an element here

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Simplicity of design makes the first cost of Purolator's new dry-type two-stage filter as low as any two-stage filter on the market. Each element filters independently, and together they dustproof your engine as no other filter can . . . 99.98% efficient.

Users save money and get better engine protection from this new Purolator filter, too. The first stage element will last up to 2000 hours, depending on operating conditions. The second stage will usually last almost indefinitely if the first element and sealing gaskets are maintained properly.

Another big user-advantage is the way the two-stage design protects the engine despite accidental mishandling of the element. Even if the first stage element is damaged, the chance of harming the engine can be discounted when it is protected with the second stage back stop element. In addition, the second stage element lets the operator service the unit in the field, regardless of how dusty the conditions are.

Both elements filter uniformly, in depth, over their whole surface, because they're both precision made of plastic impregnated cellulose. This series of two-stage filters is rated from 450 to 1150 cfm, with exceptionally low initial restriction. Mounting straps, rainhoods and outlet adapters are available.

For more information write to Purolator Products, Inc., Department 3896, Rahway, New Jersey.

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NEW PRODUCTION and PLANT EQUIPMENT

By C. J. Kelly
ASSISTANT EDITOR

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Piston and Piston Pin Inspection and Assembly System Increases Production

A fine example of applying modern technology to the problem of quality control and the increasing demands for closer tolerances and reliability can be seen in a new system which has been recently installed in one of the country's major automobile manufacturing plants in Detroit.

This new system makes multiple dimensional checks of pistons and piston pins, marks and segregates the parts according to preset tolerances, and finally assembles the proper sized pin and piston. The result of this assembly is a match fit of 0.0015 in.

A hopper feeds the pins into an inspection machine. After inspection the pins are automatically placed on a conveyor which transports the pins to storage racks where they are kept until ready for assembly. Two Bearingizing machines and two piston inspection machines are included in the production system.

This system is a continuous movement of both pistons and piston pins. While the piston inspection is taking place the RCA Non-Mar hopper is feeding pins into the piston pin inspection machine which is located in a temperature controlled area.

Piston Inspection Line

Machined pistons are fed into the bearingizing machines where they are automatically bearingized. After this operation is complete the pistons are moved by conveyor to inspection machines. In inspection, the OD of the piston skirt is gaged in two places. Overall acceptable taper is +0.001 and −0.000 in. Parts are classified into 15 acceptable catagories in increments of 0.0002 in., as well as over and under size.

Acceptable pistons are moved to a stamping station where the parts passed in the previous step are ink-stamped according to classification. It is here that out-of-diameter parts are rejected, as well as out of taper parts.

Other dimensional checks which are made on the pistons include inspection of perpendicularity of the axis of the pin bore to the axis of the skirt cylinder. Tolerance in this operation is 0.001 per in. Parts failing this test are rejected. The ID of the pin hole is checked at four points. If the pin hole size is over or undersize the part is rejected.

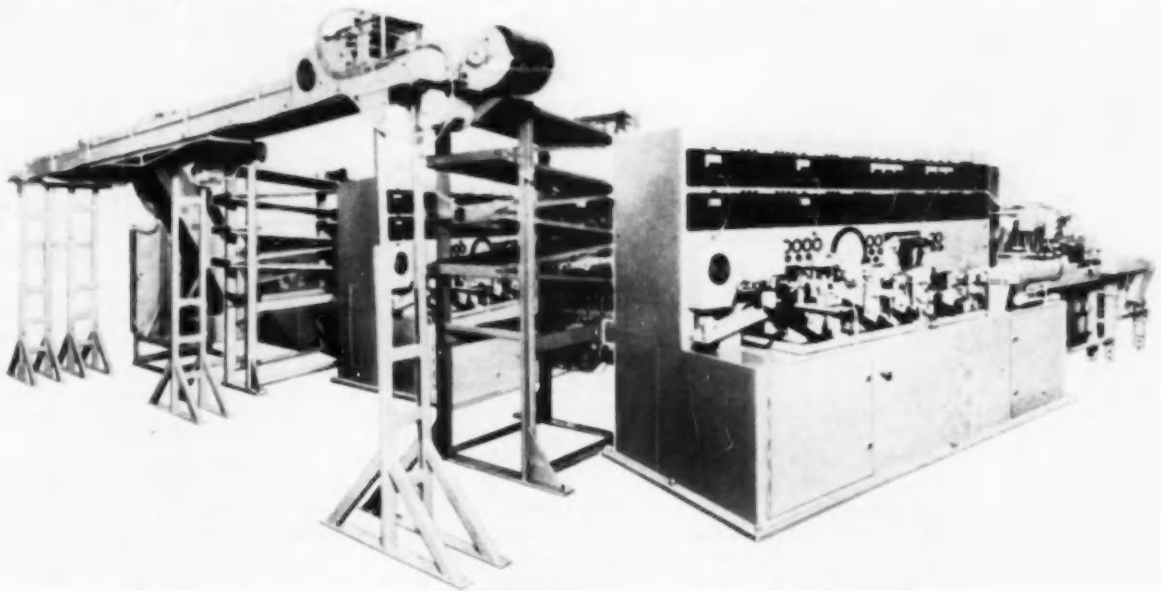
The last station of the piston inspection machine is actuated by a memory device which controls the selection of the proper pin for each piston.

Pin Inspection Line

In the pinline the OD of the pins are checked at both ends. Over and undersize pins are rejected automatically. Pins that pass this test are classified into five categories. The catagories are based on diameter in increments of 0.0001 in. Pins then pass through five segregating gates and are fed to storage bins, or chutes.

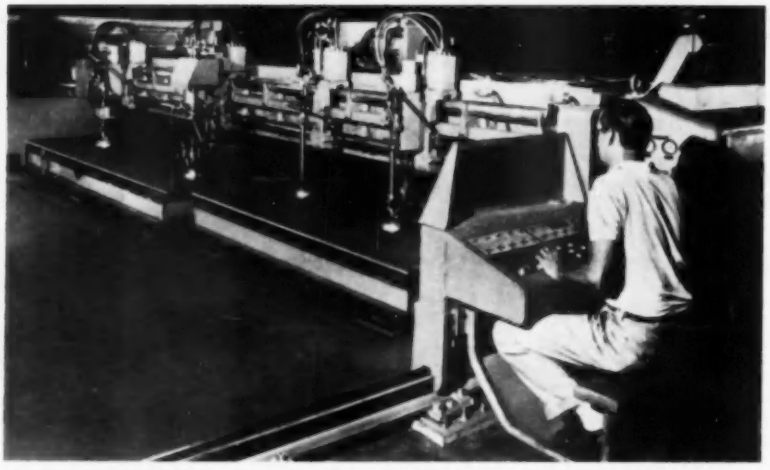
When complete inspection of each pin is final an electronic memory device signals for the release of the proper size pin from one of the five storage chutes. The pin is then inserted into the piston pin hole and the assembled parts are moved to storage.

This system was built by the *Industrial Controls Div., Radio Corporation of America.*



This automatic piston and piston pin inspection and assembly system was recently installed at General Motors

Numerically Controlled Flame Cutting Machine



Only manual control necessary with new numerical flame cutter is initial positioning of torch head

A FULLY automatic flame cutting machine has been introduced to the metalworking industries. This new unit is the result of several years of intense research and development. An important feature of this machine is its ability to produce complex shapes without the expense involved in preparing a template. The unit is completely controlled by numerical tape from a console located away from the actual cutting operation.

Once the shape of a part is decided upon by the design engineers, it is necessary to "program" into the control only that information which usually appears directly on the drawing. This is accomplished by typing the coordinate information from the drawing on standard office equipment which encodes this information on 8-channel punched tape. This tape then serves directly as the control input media.

All cutting movements are completely controlled by the control console from prepared tape. If there is more than one piece needed the oprator need only move the torch head manually to the point where the first cut is to be started. Cutting speeds, also controlled by the console, can be programmed within the limits of 2 to 35 ipm. The machine is equipped with a fast traverse which can travel up to 150 ipm.

The prototype is equipped with 4 torches and is reported to be accurate within ± 1/64 in. Larger models and up to eight torches can be designed to meet special requirements. This machine will handle sheet steel up to 22 in. in width, up to 6 in. in thickness and up to 40 ft in length.

The new flame cutting machine was developed by *Air Reduction Sales Co.*, in cooperation with *General Electric Co.* whose Mark Century tape control unit was used.

Circle 41 on Inquiry Card for more data

Die Polisher

A DIE polishing machine, for grinding and polishing contact surfaces of carbide and steel round core extrusion and draw dies, polishes nearly all styles of dies. This unit utilizes an endless abrasive belt driven at 5000 rpm to polish the die parallel to the line of draw. It is suitable for polishing new dies as well as reworking worn dies. New development on the Die Polisher is the angle polishing fixture, which will maintain die manufacturers' specifications on approach, back relief angles and bearing sizes with highest accuracy. *The Parker-Hartford Corp.*

Circle 42 on Inquiry Card for more data

Vertical Turning Machine

PRECISION contouring of nose cones up to 30 in. in diameter with an accuracy of ±150 millionths of an inch is featured on a new vertical turning machine. Called the model 291, this unit is equipped with a dual axis electro-hydraulic tracer system. It has an all transistorized electronic control to guide both horizontal and vertical travel simultaneously through 360 deg of motion.

This machine utilizes vertical design to eliminate deflection and facilitate easy loading and centering. The 30 in. worktable is powered through direct current drive and a four speed transmission, offering variable potentiometer controlled speeds from 12 to 1000 rpm. *Frauenthal Div., Kaydon Engineering Corp.*

Circle 43 on Inquiry Card for more data

Electric Winch-Hoist

NEW PORTABLE electric winch-hoist features a single line pull of 4000 lb. Called the My-Te Super, this unit measures 13 in. wide by 21½ in. long by 11 in. high, and weighs 160 lb. The device is powered by a 110 volt, single phase 60 cycle ac motor. Free load speed is 15 rpm.

First reduction consists of helical, spur, worm and worm gear, with second stage reduction of heavy duty spur gears. Other features include Timken® bearings and stress proof shafts. *City Engineering Co., Inc.*

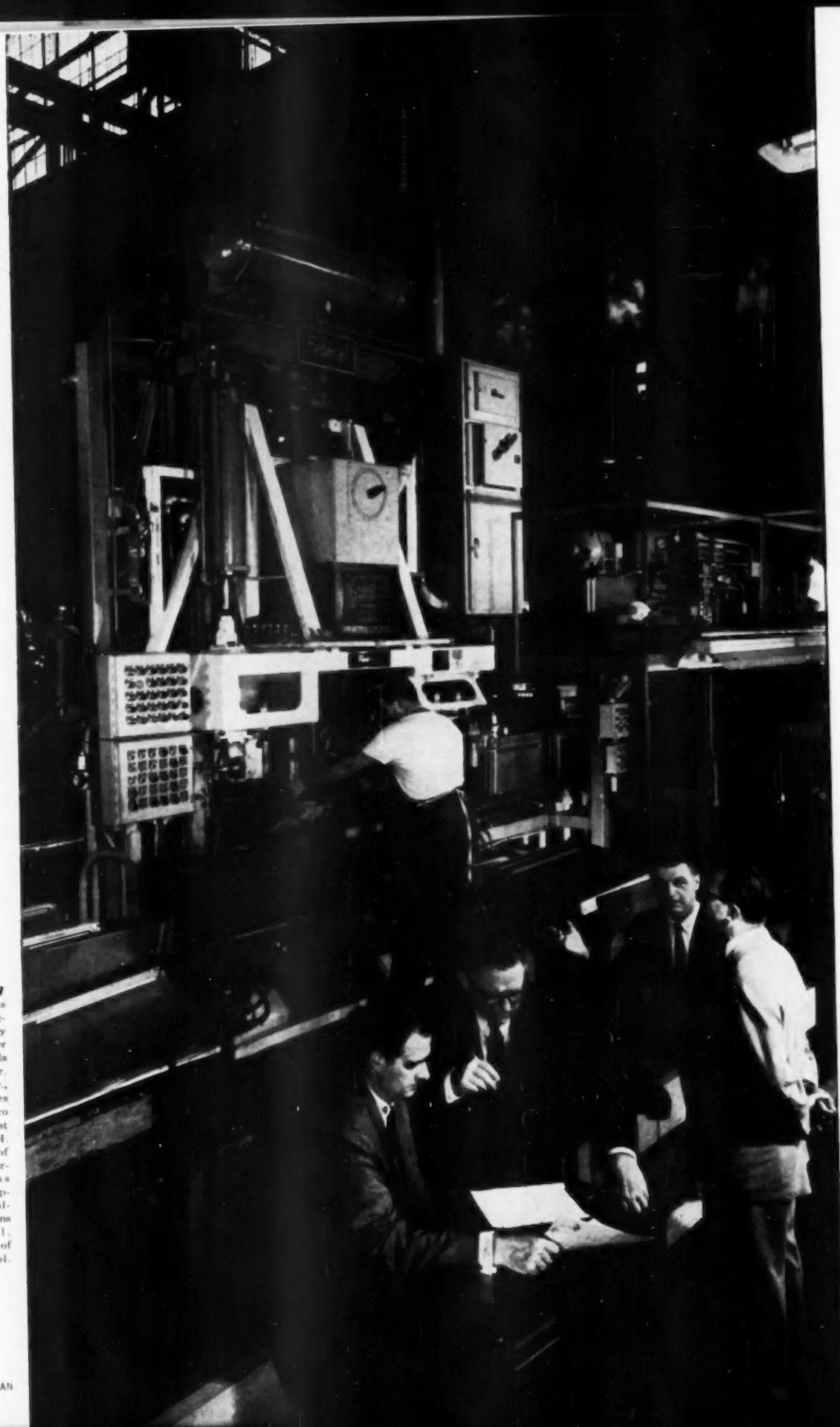
Circle 44 on Inquiry Card for more data

Hardness Tester

THIS instrument can be used as a standard bench-type unit for inspecting small parts. Removed from the stand or frame, the main body can be equipped with hand grips and used to check the hardness of large objects, even those with complicated contours. Readings are given in both Vickers (40-1000) and C scales (20-

70). In addition to steel, this instrument can be used to check soft metals such as aluminum or copper whose thickness is more than 0.6 mm. Overall height with stand or frame is 10½ in. Standard accessories include a flat anvil, V-anvil, inclined bed and gage, and an indenter adjusting tool. A U-shaped clamp and other accessories for use in testing the inside surface of parts such as cylinders are also available. *Radio Corp. of America.*

Circle 45 on Inquiry Card for more data

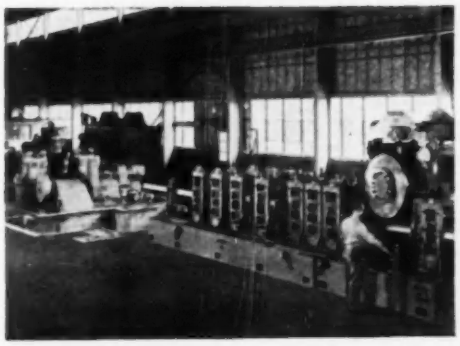


Federal Welding Line at Whirlpool's Evansville, Indiana, refrigerator plant automatically forms and welds together complete food liner shells at a rate of 200 per hour. Here, F. A. Bodenheim, Jr., manager of welder sales for McKay's Federal-Warco Division, goes over latest production charts with H. J. Muehlbauer, director of manufacturing engineering for Whirlpool, as Robert Bussell, sales representative for Federal-Warco, discusses operations with Gene Rommel, general superintendent of tooling for Whirlpool.

Photo by ARNOLD NEWMAN

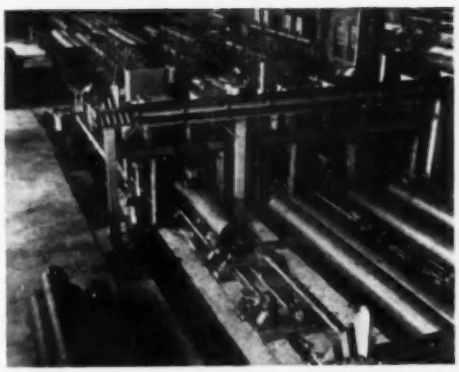
A completely integrated plant . . . a single source of supply . . . one area of responsibility! A new idea? Not really, but an idea that's not easy to bring to reality. McKay Machine has done it for metal fabricators, designing and building equipment to volume produce parts or entire units from raw steel to finished product. ***This is McKay Machine*** We know steel handling . . . we've been designing uncoilers and coil-handling equipment for 30 years. McKay Machine knows welding because the highly respected names of Federal Welder and Berkeley-Davis are now a part of our company. We know processing and forming . . . McKay levelers, tube mills, and cold roll forming machines have been specified by leading industrial firms for more than two decades. And McKay Machine knows stamping, as the Warco Press name testifies. McKay builds the industry's most popular shearing and slitting equipment. Only McKay Machine designs and builds all the components for a truly integrated production line. If you are one of the hundreds of manufacturers who must shave production and handling costs to successfully compete, McKay Machine should interest you. If we do, let us know and we'll meet with you at your convenience. *The McKay Machine Company, Youngstown 1, Ohio.*

McKAY MACHINE



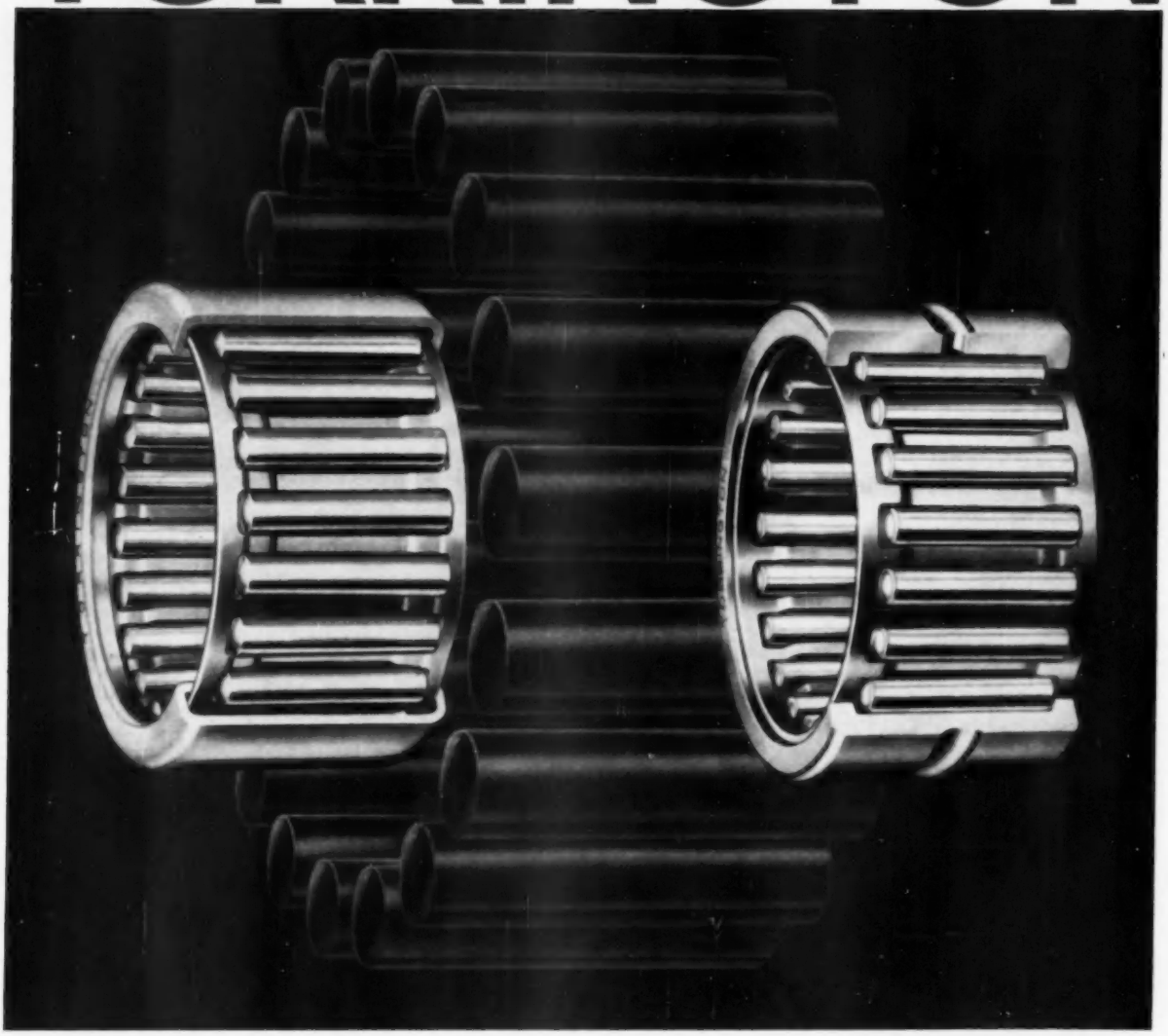
McKay Tube Mills and roll forming machines are considered among the best engineered in the world.

Warco Presses can be found in the leading automotive, appliance and aircraft plants . . . wherever stamping is a major operation.



Berkeley-Davis Fusion Welding Lines, such as the huge installation above, are used by an ever-increasing number of leading steel fabricators.

TORRINGTON



WHATEVER THE DUTY...TORRINGTON HAS A BEARING FOR IT

Take these two bearings:

The unique Torrington Drawn Cup Roller Bearing opens new design possibilities in alternators, power-tool motors, electric mixers, vacuum cleaners and a host of similar products. It is so light, compact and efficient that designers have more flexibility than ever before. Yet the Drawn Cup Roller Bearing costs less than any other anti-friction bearing of comparable performance. In many cases, armature bearing costs have been reduced as much as 50%.

The Torrington Heavy Duty Roller Bearing is ready when the going is tougher. Controlled Contour rollers insure uniform loading and prevent stress concentration at the roller ends. A patented flange-riding retainer insures positive roller guidance and provides ample lubricant storage area. Torrington Heavy Duty Roller Bearings have proved highly successful in two-cycle engines, hydraulic pumps, oil-field equipment and transmission systems.

These are just two examples of Torrington's outstanding capability in bearing design and manufacture. Remember that Torrington makes **every** basic type of anti-friction bearing... can supply the bearing that's **exactly** right for your application. Don't hesitate to call us for advice.

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By C. J. Kelly
ASSISTANT EDITOR

Safety Device

A new safety device for trucks and busses has been designed to protect single unit vehicles from runaway in the event of failure of any part of the air system. The new product is called Dual Treadle Valve and is basically two application valves mounted side-by-side and fed by two separate air storage reservoirs with a check valve mounted on each feed line so if air is lost from one system or axle the other tank will still provide air for the other axle or axles. A single pedal applies force to the two application units through a compensating lever actuating the two independent air systems so that the vehicle's brake system can be controlled axle by axle. When plumbed into a vehicle in the prescribed manner, a failure of any component in the air system controlling one axle will not affect the functioning of the balance of the braking system.

Another bonus feature of the part is an adjustment that varies pressure output from side to side. This exclusive feature allows the operator to balance braking effort or balance lining wear between any two axles. *Williams Power Brake Equipment Co.*

Circle 50 on Inquiry Card for more data

New Brake Valve

A new differential brake valve has been developed for use on material handling mobile and off-the-road equipment. The device has two normally-open spring-return two-way valves with a common pressure port to which the master brake cylinder is connected. Each of the two cylinder ports is connected to a brake cylinder of one of the two drive wheels of a vehicle.

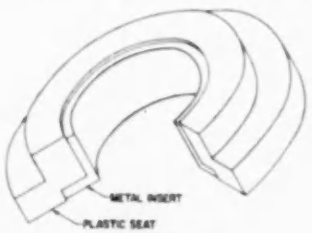
By depressing a push button, the operator may shut off flow of brake fluid to the wheel having traction in a case where one drive wheel is spinning. The operator then can depress his brake pedal and lock the spinning wheel only. This enables the vehicle to then proceed under its own power with one wheel driving until both wheels again are in traction.

The differential brake valve is designed for use with hydraulic oils or brake fluids and can be easily installed in any hydraulic brake system. *Sarasota Products, Inc.*

Circle 51 on Inquiry Card for more data

Valve Soft Seat

A new disc-type plastic valve seat has been designed with a metal insert to improve operating characteristics and increase the life of a value. The bottom of the device has been counterbored to receive a flanged metal bushing that actually forms the



TYPICAL VALVE SEAT WITH METAL INSERT

seat orifice. The metal orifice edge withstands a high fluid velocity without wire drawing or erosion. The washer-shaped section of the bushing prevents seat deformation or deflection due to pressure surges. The upper and lower surfaces of the plastic seat remain the sealing surfaces used to prevent leakage; thus the valve retains the advantages of soft-seating such as elimination of galling and scoring, and bubble tight shutoff with minimum handle torque. *Robbins Aviation, Inc.*

Circle 52 on Inquiry Card for more data

Engine Thermostat

A new, compact, fast-response thermostat unit expressly designed to detect marine or other engine overheating and compression warning has been announced.

The 2000-2 unit has exceptional resistance to shock, vibration, and corrosion. A precision snap-acting bimetal disc assures positive response in temperatures from —65 to +480 deg F. Temperature differential is 12 deg F, temperature tolerance ±2 deg F. The housing is brass ¼ in. pipe plug, and includes an epoxy seal. Terminals are copper alloy, with gold plated contacts. Electrical rating is 3 amps at 24 volts (grounded case). *Thermel, Inc.*

Circle 53 on Inquiry Card for more data

Adhesive Compound

Announcement has been made of a new general purpose adhesive compound for a wide variety of industrial applications.

Known as Adhesive Number 2, the compound is a red brown color and has a reclaimed rubber base. It has an immediate grab and long tack range. The adhesive may be used in temperatures ranging from —20 to 200 deg F.

One application cited by the manufacturer was bonding cloth door panels to foundation surfaces in automotive production lines. This product has good resistance to water and high humidity. *Arno Adhesive Tapes, Inc.*

Circle 54 on Inquiry Card for more data

Cutting Fluid

A new cutting fluid that has proven through extensive field trials to perform trouble-free under extremely difficult working situations, has been introduced. This new cutting fluid, Five-Star Cimcool, has shown that it aids machining and grinding operations, increases tool life and has exceptional rancidity and rust control. *Products Div., Cincinnati Milling Machine Co.*

Circle 55 on Inquiry Card for more data

Ford Tractor Plant

(*Continued from page 47*)

are three basic models—four- and five-speed, and the 10-speed Select-O-Speed drive—incorporating many variations to satisfy customers' requirements. To assure cleanliness, all major transmission parts are thoroughly washed. A large Centri-Spray washer cleans transmission cases and an International washer cleans component parts. Both washers are fed from outside the enclosure and discharge the cleaned parts inside the enclosure.

Spline Rolling

This plant has employed Michigan Tool spline rolling machines for axle shafts for a number of years. With the current expansion program a number of spline rolling machines have been added for rolling splines on transmission shafts as well. Among the machine tools added in this program are some individual items of Buhr equipment, including an 8-station, two-way trunnion type machine for crankshaft drilling; one two-way, and one three-way horizontal boring and facing machines for machining rear axle housings; and a group of six, two-way and three-way horizontal machines for a variety of operations on differential center housings. These machines are distinguished for the size and weight of the large tractor components that are processed.

Crankshaft Balancing

It may be of interest too that the diesel version of the four-cylinder engine embodies a Lanchester type internal crankshaft balancing mechanism. This requires a large diameter spur gear cut on a flange in the center of the crankshaft. The gear is produced by hobbing in a Barber-Colman hobbing machine; then finished on a Michigan Tool gear shaver.

Altogether the plant now has more than 2300 metal cutting and assembly machines, including three lines of the latest semi-automated equipment. Almost three miles of overhead monorail conveyors are found here for the transportation of parts, engines, transmissions, and tractor chassis.

In addition, there is a 4257-ft under-floor conveyor system for chip handling from the machine shop, removing over 45 tons of chips per day. ■

Automotive Reliability

(*Continued from page 44*)

may require extensive efforts, as the occasion arises, for an all-out effort to provide to the customer a reliable product.

Other speakers at the division conferences included John H. K. Kao of Cornell University, Dorian Shainin, vice-president, Rath & Strong, Inc., Management Consultants of Boston, Mass., Harmon S. Bayer, President, Bayer, Kobert & Associates, Management Consultants, Detroit, Mich., George A. Henderson of The Martin Company, Orlando, Fla., Howard I. Dwyer, Jr., Quality Control Manager, Cincinnati Division, The Bendix Corporation, and A. M. Carey, manager, Reliability and Quality Assurance, The Martin Company, Baltimore, Md. A limited number of the complete "Transactions" covering all papers of the conference are available from the Automotive Division of A.S.Q.C. Excerpts and digests presented in the foregoing were used by the special permission of the Automotive Division. ■

Mechanical Plating

(*Continued from page 45*)

for only a few months, and costs cannot yet be determined very accurately, company officials are sure that the cost of developing the 0.0003 in. deposit is no higher than that for producing the slightly thinner electro-plate. Mechanically-plated parts are being sold at no higher prices than those charged for electro-plated items of the same description.

Salt spray resistance as required on standard Government specifications for 0.0002 in. zinc coatings, is 40 hr. The 0.0003 in. zinc coating

developed by the mechanical plating process, without chromate after-treatment, goes to nearly 60 hr in the standard test. When treated with clear chromate wash after plating, the salt spray resistance of the parts rises to about 100 hr; and with iridescent chromate after-treatment the salt spray resistance becomes 160 hr.

Because the sequence of post-plating operations in the Dyko system permits application of a chromate treatment without the need for a separate operation, the greatly increased corrosion-resistance of the treated washers is obtained at no significant extra cost. ■

Machine Tool Report

(*Continued from page* 49)

seven months. Since some of these companies are represented in the present survey and now report "no change," it will be evident that the "no change" report (in at least a few instances) should be tempered because price increases were previously placed into effect.

The companies now reporting new price increases total 7. One of these is a 3 per cent price rise effective in July. There are two 10 per cent increases, effective July 1. Another is a 5 per cent rise, with no effective date given. Three are 5 per cent rises—two effective in September and one in the 3rd Quarter.

In addition to these definite indications, one company stated, "Giving consideration to increasing price of some models, but we are still undecided in the matter." Another company answered with a question mark.

RECOMMENDATIONS

The final question addressed to the machine tool builders was, "Do you have any personal recommendations to make at this time to automotive industry officials which should be taken into account by them when planning for near-future machine tool acquisitions?"

Several of the replies, as in prior surveys, requested and recommended more time for engineer-

ing, production and try-out of new machine tools. Additional factors were mentioned, nevertheless. Here are some of the builders' remarks:

Company Spokesman — "Allow longer delivery time."

Company Spokesman—"Figure a longer lead time than has previously been figured."

Company Spokesman—"Provide as much lead time as possible to prevent 'crash' overtime programs which become costly."

Joseph P. Crosby, vice-president i/c sales, The Lapointe Machine Tool Co.—"Delivery situation already extended will get worse. Automation and numerical control require more engineering —a bottleneck."

Company Spokesman—"Keep pressure on Congress to resolve President Kennedy's tax credit dreams one way or the other, so industry knows what the rules of the game will be."

W. Dolle, Jr., assistant to the president, Lodge & Shipley Co.—"There is an apparent need for updating standard equipment, plus further investigation into new forming and cutting techniques."

Company Spokesman—"Automotive replacement programs are 'way behind schedule. The money is available, but they won't buy until the present equipment falls apart."

Ralph Lagerfeldt, executive vice-president, Colonial Broach & Machine Co.—"Suggest that in the field of broaching, every opportunity be given our industry to prove the worth of a certain machine—the productivity of a certain machine—but more especially to the construction of a machine to allow the longest possible life, wear, and also to the design for a 'near-standard' machine to be used in present, as well as in future, programs." ■

BOOKS...

MANAGEMENT GUIDE FOR MAINTENANCE SUPERVISORS, *by Bernard T. Lewis and William W. Pearson, published by John F. Rider Publisher, Inc., 116 W. 14th St., New York. Price, $1.25.* This is the first of a new Industrial Management Series. It has been planned to meet the requirements for plant maintenance supervisors in the installation and operation of a system for controlling maintenance costs.

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By C. J. Kelly
ASSISTANT EDITOR

Screw Data 1

Thread cutting screws are discussed in a new six page folder. Complete information on sizes, design, material applications, recommended hole sizes and drill sizes are included in the literature. Actual application photographs and charts are shown to complete the data. *Parker-Kalon.*

Dial Machines 2

A series of articles on dial type machines and tooling applications on these machines are being prepared. The first of the series has been completed and is offered to interested persons in industry. The complete series will consist of eight articles. *The Bodine Corp.*

Cast Irons 3

Significant properties and specifications of approximately 40 irons and alloys are presented in easily readable chart form for reference and comparison in this six-page folder. The folder also contains a handy brief definition and description of heat treat services offered. *Hamilton Foundry Inc.*

Bolt Failures 4

An incontestable case for greater mechanical reliability in high-strength fastenings is contained in an SPS Laboratory report analyzing aircraft and missile bolt failures. The 16-page illustrated study consists of data on 10 actual failures, either in flight, or on the test stand, or in preliminary quality control testing. *Standard Pressed Steel Co.*

Specifications 5

The latest issue of the Mil-Spec Catalog carries references of over 450 specifications, and has been found indispensable by many users of Specification products in the fields of lubrication, hydraulics, corrosion prevention, and similar specialized areas. In addition to the numerous references for current specifications, the list gives the Military Specification equivalent for approximately 300 Aeronautical (AN-), Air Force, Army, Navy, SAE and Aerospace manufacturers specifications. Also available, by special request, is a list of 90 NATO Symbols and the equivalent U. S. Specifications. *Bray Oil Co.*

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Salt Bath 6

Published for the heat treat process engineer looking for easy-to-use reference data on salt baths and chemicals, bulletin 200 covers a wide range of salt bath applications including neutral hardening, tempering, austempering-martempering, carburizing, annealing, high speed quenching and nitriding. Also included are definitions and application functions of neutral, nitrate and cyanide-bearing salts; a bath recommendations guide for SAE steels; and a Fahrenheit to Centigrade conversion table. *The A. F. Holden Co.*

Industrial Switches 7

Catalog 201 discusses various types of limit switches for industrial applications. Charts, line drawings and specification information, along with illustrations, cover necessary selection data for a specific switch. A section of the catalog is devoted to use in applying limit switches with emphasis on how to correctly design actuating systems. *R. B. Denison Mfg. Co.*

Corrosion Table 8

A comprehensive study of solenoid valve selection for corrosive applications has been completed. The 16-page, two-color booklet includes a discussion of solenoid valve construction, a list of over 500 corrosive chemicals commonly used in industry, seven pages of valve selection charts, diagrams showing normally closed and normally opened configurations, a flow-versus-pressure-drop chart and the general information required to select the right solenoid valve for a specific application. *Valcor Engineering Corp.*

Epoxy Products 9

A 48-page publication contains technical data on an entire line of Helix bonding agents, potting compounds, sealants, coatings and accessories which were established in 1949, and also announces a number of new epoxy products representing break-throughs in the field of high temperature, thermal-conductivity, light-weight and one-component epoxy formulations. *Carl H. Biggs Co., Inc.*

Grinding Machines 10

This 20 page bulletin gives complete specifications and includes illustrations covering the principal construction features, operations and optional accessory equipment for four new Surface Grinding Machines. The four sizes of machines covered are the 8" x 24", 10" x 24", 12" x 24" and 10" x 30", all of which include many new features for close tolerance tool and die shop or production work. *Machine Tool Div., Brown & Sharpe Mfg. Co.*

Materials Handling 11

A new 20-page condensed catalog, Bulletin SP 4070, covers a complete line of fork trucks, powered hand trucks, straddle carriers, towing tractors, attachments and container handling equipment. The brochure is provided by product lines into 12 sections. Each section opens with a four-color action photograph and contains a table giving the following product information on each machine: capacity; turning radius; overall length and width; standard fork length and height and service weight. *Industrial Truck Div., Clark Equipment Co.*

Power Cylinder 12

A complete line of air and hydraulic cylinders are covered in a booklet which provides all information needed to select cylinders by size, thrust, bore, stroke, mounting, etc. Useful information includes piston, piston rod, and tie-rod torque tables, charts on column strength, rod deflections, acceleration, factors of safety, pressure losses in pipes, cylinder forces, and other valuable data. *Miller Fluid Power Div., Flick-Reedy Corp.*

Decimal Chart 13

A new Decimal Equivalent Chart, designed for quick conversion of Birmingham Wire Gauges and fractions to decimals, is now available. The chart, printed in color on coated heavyweight card stock, measures 11 by 14 in. Birmingham Wire Gauges from 36 to 1 and fractions from 1/64 to 63/64 in. are shown in a combination color-position code to facilitate rapid identification. *Ohio Seamless Tube Div., Copperweld Steel Co.*

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Industry Standard 14

A new simplified practice recommendation listing standard stock items of the cemented carbide industry has been issued by the *Commodity Standards Div., Office of Technical Services, U. S. Department of Commerce.* This publication is entitled "Standard Shapes, Sizes, Grades and Designations of Cemented Carbide Products." The official government designation is R-263-60. The 37-page brochure covers 44 items considered most popular in industry. *Cemented Carbide Products Association.*

Knuckle Joint Presses 15

A new 12-page brochure, No. 52400, illustrates and describes the Warco line of knuckle joint presses in capacities from 100 to 2500 tons inclusive. This type press is used for press work such as coining, extruding, cold forming, sizing, swagging, heading and embossing. This press is used on short stroke work where heavy bottoming pressure is required or where a slight dwell at the bottom of stroke is required to allow metal to fill out the die. *Federal-Warco Div., McKay Machine Co.*

Blast Cleaning 16

A completely revised 28-page catalog describing a complete line of batch-type airless abrasive blast cleaning machines covers six sizes, ranging in operating load capacity from 7 to 100 cu ft. Extensive use of photographs, cross section and exploded views, and drawings is made in explaining construction features and operating sequences. *Wheelabrator Corp.*

Motor Application 17

Nineteen Hundred Sixty-One Motor Application Guide, Bulletin 010, is a 16-page bulletin which describes a broad line of single phase, three phase and direct motors. Gearmotors and selective speed drives are, also, included in this bulletin. Two motor selection charts are included in the bulletin: matching motor characteristics to specific applications for single phase and polyphase and direct current motors. Polyphase and single phase motor characteristics are discussed in the bulletin. *Century Electric Co.*

Materials 18

Industrial maintenance materials are fully described and illustrated in a new catalog. Covered are industrial floor and roof repair, machinery anchoring and grouting, and electric motor cleaning. Prices, coverages, drying time, and general application procedures are included, along with 75 products and over 30 illustrations. *Ranco Industrial Products Corp.*

Teflon Shapes 19

Eight page illustrated catalog lists available shapes and sizes of Cadco Teflon plastic. Permissible tolerances are given on all stock shapes. Properties and end use applications of Teflon shapes are described. Shapes catalogued include sheets, rods, tubing, tapes and cementable etched tapes. Also, large diameter molded bars and cylinders. *Cadillac Plastic & Chemical Co.*

Consultant Story 20

This 12 page booklet, "Helping Business Help Itself," tells the management consultant's story. It traces the growth of the consulting profession from its early beginnings at the turn of the century to the present.—American business now speeds more than $500,000,000 annually with over 2,000 consulting firms. The booklet examines the operating methods of a consulting firm from pre-assignment to post-assignment. It explores the client-consulting relationship in terms of problem areas and problem solutions. One of the booklet's highlights is a 2 page chart outlining the myriad consultant services available under each different management function. *Profit Counselors, Inc.*

Equipment 21

New 16-page catalog entitled Electric Assembly Tools gives information about equipment much of which is automatic or semi-automatic, and about how the equipment may be used for staking, swaging, riveting, punching, marking, and terminal setting. It not only tells how the various tools work, but also the different ways and areas in which they can be used. *Black & Webster, Inc.*

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New Catalogues, Bulletins, Data Sheets and Reports

Advertisers' Products and Services Data; and more information on New Production Equipment and New Products described editorially in this issue.

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Plastics Weighing 22

A special 32 page illustrated catalog on precision scales and weighing equipment specifically designed for the plastics industry is available. Described in the catalog are precision scales for a variety of uses including automatic net weighers for mounting on injection molding machines to accurately measure the plastics charges. *The Exact Weight Scale Co.*

Copper Alloys 23

Complete technical information on two high-strength and two high-conductivity beryllium copper strip products is available from data sheets. The four data sheets show physical and mechanical properties, provide information on methods of heat treating, forming, joining and plating of beryllium copper. *The Brush Beryllium Co.*

Tools 24

A new 16-page catalog, fully illustrated with phantom and exploded views, shows three types of precision adjusting tools which allow precision adjustments in tenths without loosening or tightening any screws. Eight standards of size positive boring quills are cataloged with dimensional drawings, also replaceable boring bars and solid quills. A precision control for grinding wheel dressing, providing easy and fast adjustment to compensate for diamond wear, is also shown. *Briney Mfg. Co.*

Gasket Material 25

Detailed information concerning the various styles of gasket materials available is presented in a new product brochure entitled GASKET MATERIALS. The new booklet, AD-190, provides a wealth of material to help a gasket user select and specify the proper gasket material. *Garlock, Inc.*

Storage Racks 26

Use of prefabricated storage rack materials to achieve larger warehousing capacities and greater operating efficiency is described in a new booklet, "How to Win the Race for Storage Space." Comprehensive text of the 16-page, two-color booklet explains the prefabricated design of modular rack components. *Acme Steel Co.*

Test Kit

A free test kit which will show up porosity in improperly molded Teflon Sheet is offered by producers of Chemfluor Teflon. According to the manufacturer, the purpose of this offer is to give users of Teflon **sheet a means of verifying the uniformly high density of their product. "Any one interested in determining quality of Teflon may obtain one of these test kits by simply sending us a request on his company letterhead. Comparison between our product and other molded Teflon sheet will speak for itself." *Chemplast, Inc., 3 Central Ave., East, Newark, N. J.***

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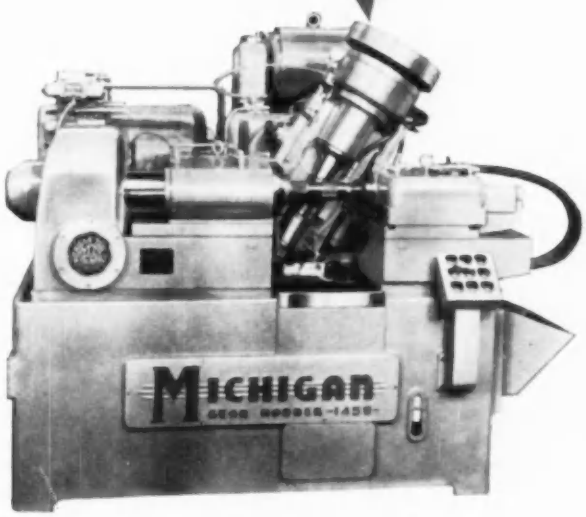
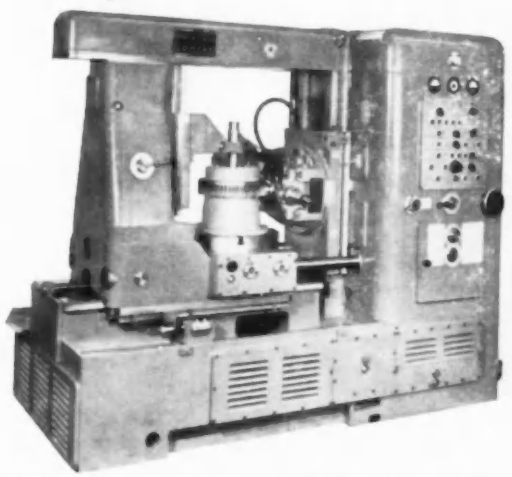
Why EUROPE wanted U.S. hobbers

Why WE added LORENZ (GERMAN) designs



Michigan 1458B hobbers are available for gears up to 12" OD and 4¼" face width. Ask for Bulletin #1458-61.



Michigan-Lorenz hobbers are available in 3 styles for gears up to 24" capacity. Ask for Bulletin #ML-61.

IN EUROPE, industry has extensively switched to mass production methods and equipment. This calls for machines that will stand the gaff day after day in continuous production. One major company decided to test all hobbers . . . European and American. The MICHIGAN 1458B hobber was found the ideal machine despite higher cost than for European machines. It gave top output, high accuracy, minimum downtime, freedom from service troubles. Since then, Europe has been a repeat buyer of 1458B hobbers.

If you want to cut your production hobbing costs, you too will find the 1458B the machine that can really do it.

IN THE UNITED STATES, gear producers who needed more versatility with high accuracy and low cost have eyed European hobbers for some time. Michigan Tool Company joined them and found that the design of the German Lorenz line of hobbers came closest to meeting U.S. needs. An engineering arrangement was made and today, as the MICHIGAN-LORENZ line, these versatile hobbers are available as American-built machines produced by Michigan Tool Company.

If you need top versatility with accuracy and ruggedness—you too will find MICHIGAN-LORENZ hobbers (and shapers) will cut your costs.

MICHIGAN TOOL COMPANY, 7171 E. McNICHOLS RD., DETROIT 12, MICHIGAN

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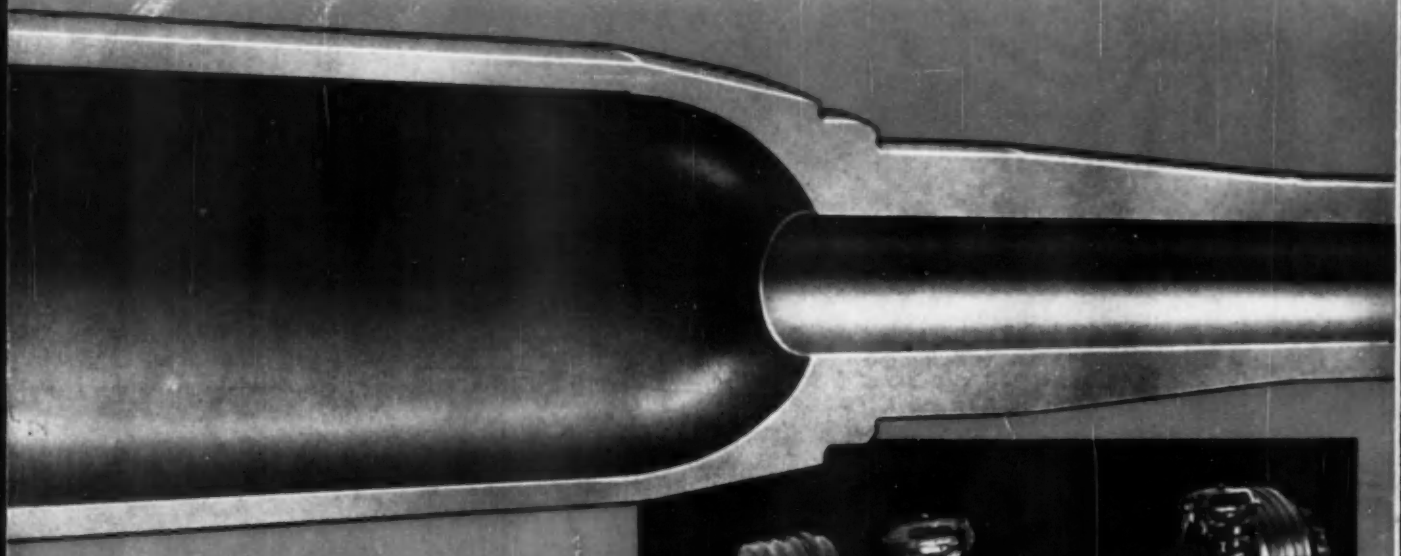
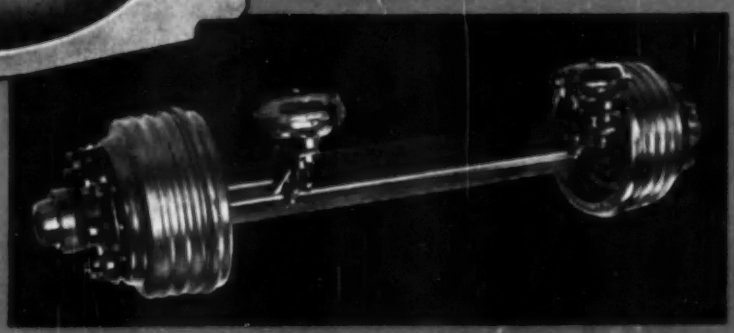
New lightest-weight SHULER AXLE creating great interest





Prompt shipments now being made

IN February, Shuler announced a completely new light-weight trailer axle—product of five years' research and the development of a tough and rugged new steel.

A major breakthrough in engineering design, the new Shuler axle weighs 50 pounds less than the 20,000-pound-capacity Shuler tubular axle it replaces. Strength is equal.

Inquiries and orders for sample 20-L axles have been pouring in at a record rate, and shipments are now being made. If you have not yet sent for full details, we urge you to investigate this major new achievement. Address:

SHULER AXLE COMPANY
Incorporated
2900 Second Street, LOUISVILLE 8, KENTUCKY

Subsidiary of Eaton Manufacturing Company

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